PUBLIC HEALTH REPORTS

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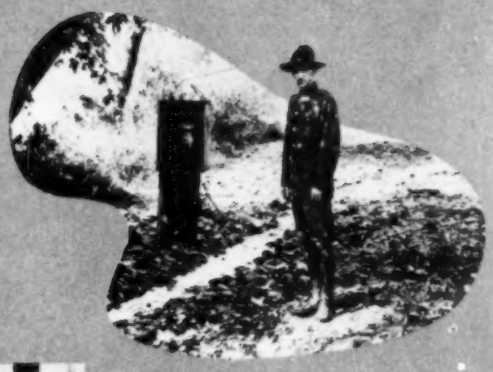
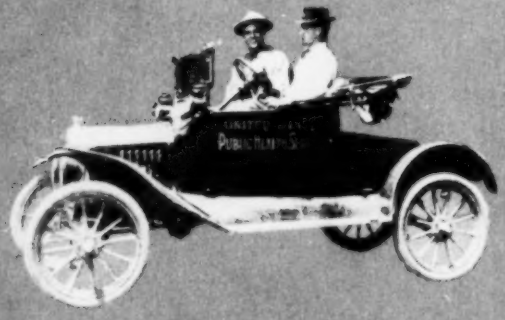
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service





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years ago in Public Health Reports

Public Health Reports of 1903 reported an important milestone in the history of public health administration: the first conference of State and Territorial health officers with the Surgeon General. In the report of the 1953 conference—the 52d such conference—references will be found to prophetic remarks by Dr. Wyman (p. 61 and pp. 84–87).

The problems of 1903 in the field of Federal-State relations were, quite obviously, elementary insofar as public health administration was concerned, but not so elementary insofar as disease control and investigation and relations with the public. "Signs of the times" of the past half-century are pictorially suggested by the frontispiece, and the following are random selections of items from volume 18 of *Public Health Reports* and its supplements published in 1903, reflecting some of the domestic public health activities of that day.

"The presence of plague in California is established beyond debate . . . The presence of plague in any community where proper restrictions are not taken to prevent its spread is an injury to the best interests of that community. Such injury is in any case avoidable by the proper cooperation of all interest[s] involved, commercial, professional, and governmental. This conference regards the habitual publication of the actual facts relative to infectious disease and preventive procedures as the surest route to popular confidence, and is one of the means best adapted to minimize the injury liable to result from the presence of such diseases."

—Plague Conference, PHR Supplement No. 4, of January 23, and No. 6, of February 6, 1903.

Resolutions adopted unanimously by the First General International Sanitary Convention of the American Republics (Washington, December 2–4, 1902) included one "That measures of prophylaxis against yellow fever shall be based upon the fact that up to the present time the bite of certain mosquitoes is the only proven natural means of propagation of yellow fever."

—PHR for February 20, 1903, p. 233.

"After consulting with Dr. C. D. Smith, president of the State Board of Health, I proceeded to Augusta [Maine] on the 15th ultimo [February], discussed with Dr. A. G. Young the matter of assisting the State board in its work of checking smallpox in the northern part of the State, and made recommendations by telegraph for the establishment of a detention camp at Glazier Lake, and the employment of inspectors. . . ."

"My appointment as county health officer [Rock Springs, Wyoming] took effect December 26, 1902. At this time I am pleased to report to you that we have but one case of smallpox, which belongs to the 'nonvaccine' and 'not afraid' class, and is now serving his sentence in the pest house. . . ."

—Reports of officers to the Surgeon General, PHR for March 13, 1903.

"The monthly bulletin of the Indiana State board of health for June [1903] says: Better health existed in June than in the preceding month, but no improvement appears in comparison with June of 1902. Rheumatism was the most prevalent disease, as it was also in the two preceding months. Tonsilitis and bronchitis were, respectively, second and third in prevalence. Typhoid fever was fourth, having moved up from seventh place in the preceding month. Smallpox was sixth, having fallen from third place. Diarrhea, as was to be expected, increased in June over May, yet dysentery and inflammation of the bowels show no increase. Diphtheria, pneumonia, and influenza were very much less in June than in May."

—PHR for July 24, 1903.

"1. In the case of smallpox, *vaccinate, isolate, and disinfect.*

"2. In the case of scarlet fever, *isolate and disinfect.*

"3. In the case of diphtheria, *isolate, administer antitoxin, and disinfect.*"

—PHR Supplement No. 38 of September 18, 1903, from a paper by Assistant Surgeon-General H. D. Geddings before health officers in Vermont and Indiana.

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PUBLIC HEALTH REPORTS

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OVETA CULP HOBBY, *Secretary*

PUBLIC HEALTH SERVICE
LEONARD A. SCHEELE, *Surgeon General*

Agricultural Migrants and Public Health

By LUCILE PETRY LEONE, R.N., M.A., and HELEN L. JOHNSTON

A COOPERATIVE inter-State and intra-State approach to migratory labor health problems was discussed by State health authorities during their Washington meetings November 4–7, 1953. At these meetings, the Association of State and Territorial Health Officers adopted the following resolution as recommended by its Special Health and Medical Services Committee:

"The Association encourages regional conferences . . . of health officers of States along major migratory streams to work out reciprocal programs for protection of the health of residents and migrants . . . to assure greater continuity and uniformity of services to migrants moving from State to State; and to share experiences on how localities and States go about meeting their problems. It is further recommended that each State and Territorial Health Officer examine the situation in his own jurisdiction and sponsor conferences with other State agencies concerned with the migratory problem."

In support of its recommendations, the Committee pointed out that "a large number of farm workers, many with families, migrate from State to State along fairly definite routes following the harvest of the major farm crops. Experience has shown that there is a high incidence of illness among these people and that there is a great variation in standards and services from State to State. The control of communicable disease and the meeting of the general health needs of groups of workers and their families at points along the routes would benefit from continuity and greater uniformity of services and procedures. It is believed that effectiveness of each individual State program would be increased by such a cooperative approach. It would tend to eliminate gaps and

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Mrs. Leone, Assistant Surgeon General and chief nurse officer of the Public Health Service, is chairman of the Service's Interbureau Committee on Migrants. She served in 1952 as co-chairman with Dr. Otis L. Anderson, Assistant Surgeon General, and chief of the Bureau of State Services. Miss Johnston, a staff member of the committee, has done extensive work in the field of rural health for the Public Health Service; from 1943 to 1949 she was an economist in the Department of Agriculture.

The following background information is based largely on the work of the committee, which has recently prepared a general overview statement of the current situation, including data from detailed national and State reports concerning the living and working conditions of farm migrants, their health situation and services, and recent recommendations by a variety of groups.

The health problems involved are varied and complex. An interchange of experiences among health agencies dealing with these problems would serve a useful purpose in the development of improved practices. The pages of Public Health Reports are open to papers and reports on this topic.

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duplications. It would also tend to improve services and standards and reduce present wide variations from one locality and one State to another."

The Situation

More than a million farm workers and their dependents follow the crops each year, moving from State to State as well as within States to supplement the local labor force at critical periods of crop production (*3*). Migrants comprise only about 7 percent of the farm labor force. They are employed in significant numbers on only about 2 percent of the Nation's farms, but to the large-scale industrialized farm and to many smaller specialized farms their help is indispensable. Without them, crops in some areas could not be produced and harvested. At the present time, migrants help to meet peak season farm labor demands in local areas of nearly every State for at least a few weeks of each year. Even with increased farm mechanization and greater productivity per worker, it seems unlikely that the need for them will wholly disappear.

Farm migrants can be roughly divided into the following major groups, according to seasonal routes (*4*):

- Atlantic Coast—chiefly Negro families working in fruits and vegetables;
- Texas to the North Central and Mountain States—chiefly Spanish-American families working in sugar beets;
- Texas to Montana, North Dakota, and Canada—single men, or men who leave their families at home as they follow the wheat and small-grain harvest;
- Texas to California and the Mississippi Delta—Spanish-American families working in cotton;
- South Central to North Central States—Anglo-Saxon families working in fruits and vegetables;
- South Central States, Arizona, and southern California to northern California and other western States—Spanish-American, Negro, Indian, Anglo-Saxon, Oriental, and Filipino families working in fruits, vegetables, and cotton.

About half of the farm migrants are United States citizens. Most of the remainder are Mexican nationals. During 1952, nearly 200,000 Mexican farm workers came into the country temporarily under an international agreement between the United States and Mexico (*5*). Several times this number came into the United States illegally as "wetbacks," crossing the Rio Grande or elsewhere along the Mexican border without being detected (*5, 6*).

The aliens who enter the United States legally present a relatively minor problem. They are single males, screened for physical defects before entry. Unlike domestic migrants, they work under contracts which provide minimum guarantees regarding wages, housing, transportation, and protection against occupational disease and accident.

Wetbacks, on the other hand, enter the country without physical examination. They work without contractual protection and under constant threat of being apprehended and deported. They have no recourse if the wages paid are less than those offered, or if housing or other living and working conditions are below a minimum standard. The control of wetbacks is under the jurisdiction of immigration authorities, but the possible spread of disease by them is a public health concern.

Of still greater concern to health, education, and welfare agencies than the foreign migrants are the three-quarters of a million domestic workers and their dependents who comprise half of the farm migrant population. Citizenship entitles them to the rights and benefits enjoyed by other citizens. Too often their rights have been ignored because of local residence laws, shortages of local services, community disinterest or antagonism, and other reasons.

Many domestic migrants belong to a racial or national minority. Some are family farm workers or operators from marginal farming areas who become part of the farm migrant labor force for part of the year. Illiteracy or inability to speak and read English are common among them.

Working and Living Conditions

A single worker or worker with his family may travel only within one county or he may

travel more than a thousand miles and through a half-dozen or more States. In any case, the work on which he depends is so far from home that there is no chance to return each evening. "Home" may be only the one of his temporary residences in which he happens to spend several months of the year. It is unlikely to be home in the sense that it confers upon him and his family legal residence status. Nor is it home for a long enough time to enable the family to build for itself a permanent place in the community.

The professional or skilled worker who moves to look for a better job sooner or later becomes assimilated into his new community. But for the agricultural migrant, migrancy is a regular condition of his employment. He may never live long enough in a single community to share the rights and benefits available to other citizens. He is not a commuter, nor does he move from one community where he has been a permanent resident to another where there may be only a temporary dislocation during the process of assimilation.

The agricultural migrant belongs to a heterogeneous, widely dispersed group that cannot easily be organized to improve its situation. Wherever the migrant goes, he and his family are "outsiders." Their constant need for shifting from place to place makes it impossible for them to accumulate wealth or to build substantial housing. In addition to the fact that residence requirements bar him from qualifying for some community services, the migrant, himself, may lack interest or understanding, or he may be afraid to seek needed services, hesitating to disturb a possibly unfriendly community. Local residents at best may be indifferent and at worst, hostile, afraid that he and his family represent a hazard to the health, morals, and property of the established community.

Earnings

Like most other hired farm workers, he is not covered by minimum wage, workmen's compensation, unemployment compensation, and other protective legislation. He also lacks the health and welfare benefits made available to many industrial workers through collective bargaining.

Health and the Farm Migrant

". . . While some transients resemble, in their hygienic surroundings, residents of the same economic status, a greater proportion are forced to exist under almost every imaginable variety of insanitary condition . . . Serious overcrowding in the shelters is almost universal . . .

"Many camps not only have unsatisfactory facilities for sewage disposal but lack even a water supply that is fairly safe . . . A high rate of digestive diseases is normally found among persons living under such conditions.

"The effect of transients on community health is to increase the hazard of ill health to residents and to raise the incidence of most of the communicable diseases . . . This results chiefly from the fact that transients are not given equal consideration in community programs of sanitation, preventive medicine, and isolation of infectious cases of communicable disease."

These excerpts summarize the health situation of migrants according to a Public Health Service study covering 15 States in 1938 (1). The findings closely parallel those of a Colorado study in 1950 (2):

"Migrant families were large, averaging 5.7 persons.

"About half the families lived in one room.

"Only one-third could be sure their water supply was safe. For 13 percent it was obviously unsafe.

"Most families used 'pit toilets,' of which less than 1 in 4 would have passed elementary health inspection."

A Colorado physician remarked: "We know that communicable diseases are present among the migrants. The fatalistic acceptance of the situation, plus their poverty, makes the problem of medical care a critical one. Tuberculosis, enteritis, smallpox, typhoid fever, dysentery and venereal diseases have been more often detected by accident or search by public health officials than by patients voluntarily seeking medical assistance . . ."

The wages paid migrants may be relatively good—at least as high as those paid local workers at similar jobs. Annual earnings, however, are reduced by time lost from work as the result

of bad weather, poor crops, time consumed by travel from one place to another, and the problem of getting to the right place at the right time. Even with off-farm work to supplement work on farms, continuous employment throughout the year is unusual. It occurs only when workers have been able to piece together a number of jobs to make a long period of employment.

In 1949, less than 10 percent of the farm migrants in the United States had a full 250 days of work during the year. The remaining 90 percent averaged only 101 days per year. When both farm and nonfarm work are combined, earnings per worker averaged $514, excluding the earnings of children under 14. Annual family earnings are estimated at between $1,200 and $1,500 with two or more family members contributing to family income.

Average hourly earnings for all hired farm workers—including nonmigrants as well as migrants—have ranged from 24 to 44 percent of factory workers' earnings in recent years. Noncash perquisites—housing, garden space, and other items furnished by the farm operator—raise the annual cash earnings of regular hired farm workers by about 11 percent. For seasonal workers the value of noncash perquisites is only 7 percent of annual cash earnings.

Health, Housing, and Medical Care

Disabling illness rates for interstate family transients, according to the Public Health Service study in 1938 (*1*), were nearly twice those for residents of moderate or comfortable economic status and 1½ times the rates for residents of low economic status. Rates for epidemic and digestive diseases and for accidents were about twice as high among transient families as among residents.

Recent studies and reports confirm the findings of earlier studies indicating that the health level of migrants is below that of permanent residents of a community. Fresno County, Calif., prevalence of diarrheal disease among children observed in farm labor camps during July–December 1950 were significantly higher than for children observed in housing projects and at child health conferences (*7*, *8*).

The infant mortality rate among Colorado migrants was nearly twice that for the State according to the 1950 study (*2*). More than a third of births to migrants in the 5 years 1946–50 were not attended by a physician. Only 42 percent of the persons surveyed had had smallpox vaccination. Only 10 to 20 percent had had diphtheria, whooping cough, or tetanus immunization.

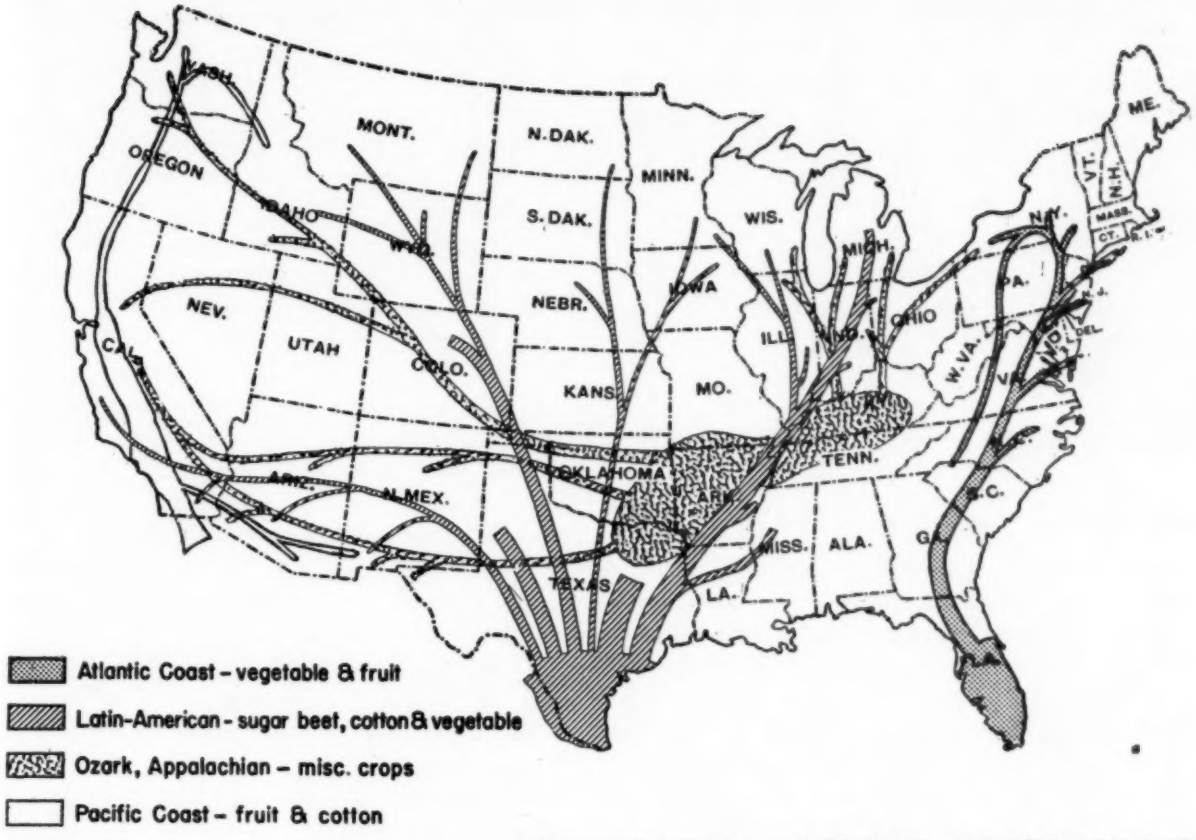
Nutritional deficiencies are common. The diets of migratory families are affected by low income and by lack of adequate cooking facilities, facilities for food storage, or time for food preparation, as well as by lack of understanding of nutrition requirements. A physician testifying before the President's Commission on Migratory Labor in 1950 reported dietary deficiency diseases such as pellagra among migrant workers as well as "ordinary starvation" (*6*). The Colorado study (*2*) commented on the "poverty diet" of the families surveyed in 1950.

Housing and Work Hazards

A number of States have laws or regulations which apply to all labor camps or to migrant camps specifically. In some, enforcement is not adequate. In other States, laws and regulations are lacking. According to a labor department official in one State: ". . . we have migrant workers living . . . in tents with no floors, on canal banks without any proper sanitation . . ." (*6*). A health officer in another stated: "Workers . . . crowd into shacks, tents, trailers, and similar quarters. Adequate and safe water supplies, toilets, bathing facilities, and proper sewage and refuse disposal are seldom provided . . ." (*6*).

However, some employers insist that poor housing conditions are not always their fault, and that housing which meets an approved standard is sometimes misused by the workers who occupy it.

The living conditions of migratory workers frequently lead to recurrent digestive disturbances and to the spread of respiratory and other infections. In addition, the migrant shares with other farm workers exposure to the occupational risks of agricultural employment—accidents, chemical poisonings, skin disorders



Source: U. S. Department of Labor, Bureau of Labor Standards.

Travel patterns of seasonal migratory agricultural workers. The map shows the northward migratory movement. This is reversed as the crop season ends in the northern States and the workers drift back to home base—for many of them, southern California, Texas, and Florida.

from working with citrus fruit, and other hazards (*9*).

Medical Care

Except in extreme emergency, migrants are usually without regular medical services. An employer sometimes assumes responsibility for medical care for his workers. In rare cases workers are covered by insurance. Emergency hospitalization is sometimes financed by local welfare departments.

The 1938 study (*1*) reported: "The data presented on the cost of public hospitalization now being supplied to transients in general hospitals seem to show that an enormous load from this cause is being carried by some communities, in spite of the fact that transients generally receive considerably less medical care and hospitalization than do residents."

In 1950 one Colorado county spent nearly $5,000 for hospital care for 19 migrant families. Another reported spending $65,000 for tuberculosis patients during the previous 5 years. Between 50 and 60 percent of the patients were from "the substandard slum type of housing in which Spanish-American agricultural workers live." In no other Colorado county was comparable assistance to migrants reported (*2*).

The combination of poor diet, poor living conditions, and lack of medical care tends to aggravate any disability a migrant may have. This fact was commented upon in 1938: "Living in a camp . . . and other temporary quarters, lacking even facilities for self-medication or continuous rest in a comfortable bed, a disabled transient who cannot secure medical attention not only is subjected to a more miserable experience than is a resident ill of the same condition but he is also much more likely to have serious complications . . ." (*1*).

A handicap that is likely to affect the migrant more acutely, although shared with other rural residents, is the lack of physicians, nurses, and other health personnel in rural areas compared with urban places.

The interrelatedness of health, education, and welfare problems of migrants is illustrated by recent statements of State school officers (*10*). When asked the reasons migrant children were not in school, they often referred to problems of health—either real or based on suspicions of the community that the migrant child might be a disease carrier as the result of his living conditions.

Governmental Responsibilities

Responsibility for eliminating the problems which arise because of migrant labor and meeting the needs of the migrants is widely diffused through national, State, and local governments and agencies. In the Federal Government, for example, the Department of Justice, through its Immigration and Naturalization Service, is responsible for control of wetbacks. The Departments of Justice and Labor share responsibility for the legal importation of Mexican workers, with the Public Health Service assuming responsibility for health examinations. Other responsibilities of the Department of Labor include aiding "workers to find jobs and employers to find workers," and enforcing the Federal child labor law. The Department recognizes child labor in agriculture as a major problem in enforcement of this law.

The Bureau of Indian Affairs in the Department of the Interior has a concern for migrants to the extent that reservation Indians become part of the migratory labor force for part of each year. The Department of Agriculture makes studies of farm migrants as part of its investigations of the farm population and farm manpower. In some cases its educational services are extended to migrants through the Agricultural Extension Service.

The Department of Health, Education, and Welfare has varied responsibilities under programs to serve all eligible persons, in some cases the entire community. Such programs include those of the Children's Bureau, the Office of Education, the Bureau of Public Assistance, the Office of Vocational Rehabilitation, and the Public Health Service.

This résumé of Federal responsibility is, of course, incomplete, but it serves to illustrate the scattering of interest and concern for the welfare of migrants that is generally found in State and local governments and among voluntary agencies as well. With few exceptions, programs are designed to serve a permanent community and are ineffective in reaching migrants. Many of the reasons for their ineffectiveness have already been referred to—residence requirements; inadequate facilities, staff, and funds; language barriers; generally inadequate means for informing migrants of the services available or for informing agencies of migrants' needs; and other obstacles. Moreover, programs designed for a fixed population often must be modified to meet the needs of a population "on the move."

A further problem for the migrant in obtaining community services is the attitude of residents in many areas, which is usually reflected at least in some degree by local official and voluntary groups. Although he may be greatly needed by the community for its own economic welfare, he is unlikely to be accepted as part of the community while he is there. Near the Mexican border local residents may shrug off responsibility, looking at the shacks across the border and saying of their own Spanish-Americans, "They never had it so good in Mexico." And in States farther north people may say, "These people live in shacks and hovels in Mexico and Texas. Why should we improve their conditions here?"

Local and State Programs

Where such attitudes do not exist or have been largely overcome, significant changes have occurred. Hollandale, Minn., for example—a community of less than 400—has a continuing program to get the children of 800 migrant families into schools while they are in the area. The Waupun, Wis., Community Council on Human Relations has tried to integrate the migrant workers into the community by holding "family nights" for both migrants and local residents and by welcoming the migrants into local churches.

The New York State Department of Labor requires anyone bringing in 10 or more migrants from outside the State to register. Under this requirement, 820 migrant camp properties came under health department supervision during 1952. An average of 8.2 inspections were made for each property under supervision and many improvements were reported.

New York's Interdepartmental Committee on Farm and Food Processing Labor involves 9 State agencies in efforts to plan and work together. As part of this coordinated effort, the State health department participates in providing nursing services for migrant families, supplementing local services as necessary by supplying nurses from the State staff. Before the peak season in an area, conferences are held by the public health nurses, their supervisors, and camp operators and owners to review the services available, make an estimate of expected health needs of the migrants coming in, and plan to meet these needs.

State and local programs in other areas also provide needed services for migrants. Taken altogether, however, these programs are few and scattered, important chiefly as local demonstrations. Local officials trying to stretch services to meet the needs of migrants comment: "We can't do a 12-months' job in the short time the migrants are here." How to provide continuity of services as families move from place to place is a question they feel demands solution.

Reports from Palm Beach County, Fla., illustrate the problems involved in some of the local efforts. In one labor camp in the county, school enrollment ranged from 88 in September to 314 in May. In all white schools of the county exclusive of those in the main population center, enrollment increased by more than 2,000. The increase in the Negro schools was a little less than 2,000. If all children had been required to attend, the limited classrooms could not have held them.

The Palm Beach County Health Department finds it equally difficult to meet the needs of 20,000 workers and their families coming in each year. The efforts they make may be at the expense of programs for permanent residents. And the same migrants with the same problems are likely to be back on their doorstep year after year with little evidence that they have had care while they traveled in other States.

Recommendations by Various Groups

For the last half century, local, State, and national groups have been concerned about ways to improve the living and working conditions of migrants. Recurring recommendations of various commissions and conferences give evidence of this concern. The Country Life Commission in 1909 recommended employment on an annual basis and good housing. The Tolan Committee report in 1941 recognized the need for States of heavy in-migration to adopt laws establishing minimum conditions of health, sanitation, and housing on farms employing migratory agricultural labor (*11*), and so on, to the Federal Interagency Committee on Migratory Labor's report in 1947 (*12*), the report of the President's Commission on Migratory Labor published in 1951 (*3*), and the hearings on migratory labor in 1952 (*6*).

Out of the deliberations of such groups certain general principles and recommendations have evolved:

1. A program for migrants should be developed in terms of meeting their needs as human beings—not just to meet an emergency.
2. The health problems of migrants involve need for protecting the communities where they work temporarily as well as for protecting the migrants themselves.
3. The eventual goal should be to give as many migrants as possible roots in a local community where they can make their own place, gain community acceptance, and become eligible for the rights and benefits available to other citizens.
4. Services for migrants should be developed in a way that will integrate them into rather than separate them from the rest of the population.

Services must be adapted to the special needs of migrants, however, with recognition of their differences from local community residents in background, attitude, and behavior; with estab-

lishment of stationary services at major points of labor concentration and mobile services as needed; and with arrangements for continuity of services as migrants travel from one place to another.

Special measures should not be set up to meet a need that can be met through an existing program. The interest and activities of local, State, and interstate official and voluntary agencies should be encouraged and built upon as fully as possible.

5. Existing housing, health, and other standards, and laws and regulations applicable to migrants need to be applied to their situation; if necessary, these should be modified to assure the migrant the same protection and benefits available to other citizens.

6. Methods need to be developed whereby health services of high quality—both preventive and curative—can be distributed effectively and economically throughout rural United States.

Summary

Peaks of demand for agricultural workers create peaks of need for health services in many communities in many States. Some of these communities do not have public health and medical care facilities and personnel sufficient to meet their own needs, and even those which are well supplied have difficulty in meeting the greatly increased needs presented by migrant workers and their families for a few weeks or months each year. Also complicating the problem of matching needs with services in many situations are such facts as nonacceptance of these families by the community, ineligibility of nonresidents for services of various types, and ignorance of migrants as to where to seek help.

Migrants present the gamut of needs for health, education, and welfare services—needs which are intensified by their economic and educational status and by the fact of their migrancy. Challenges to official and voluntary agencies lie in finding ways to coordinate required services locally and to make these services continuous as migrants move from place to place. Some States have made considerable progress in meeting the first of these challenges. Interstate cooperation will be required to meet the second. At stake are the health and welfare of more than a million people who make a vital contribution to our national economy as well as the health and welfare of the communities through which they move.

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Bat Rabies

By ROBERT D. COURTER, D.V.M.

THE RECOGNITION of rabies infection in insectivorous bats is an interesting and significant discovery which may have far-reaching implications as a new public health problem in the United States.

The existence of rabies infection in bats of the United States was unknown until June 1953, when it was diagnosed by the Tampa regional laboratory of the Florida State Board of Health (*1*). The first bat found to be infected was a Florida yellow bat (*Dasypterus floridanus*), which had been killed while attacking a 7-year-old boy near Tampa. Diagnosis was established by the presence of Negri bodies on microscopic examination in routine diagnostic procedures by W. R. Hoffert, senior bacteriologist in the Tampa regional laboratory. Rabies infection was confirmed by inoculation of mice with the bat brain in the Jacksonville laboratory of the Florida Board of Health. The virus isolated was sent to the Virus and Rickettsia Laboratory of the Public Health Service Communicable Disease Center, Atlanta, where it was confirmed as rabies virus by neutralization and by complement fixation tests.

Subsequently, Dr. James E. Scatterday and other members of the Florida Board of Health found rabies virus in the brains of five yellow bats (*Dasypterus floridanus*) and one Seminole bat (*Lasiurus seminola*) which were apparently normal and had been killed in flight while feeding. Both species are insectivorous and indigenous to the southeastern United States.

In September 1953, Dr. Ernest Witte, Pennsylvania State Department of Health, reported that rabies infection had been recognized in a bat which made an unprovoked attack upon a woman near Carlisle, Pa. The brain was examined in the Pennsylvania Bureau of Animal Industry Laboratory where positive evidence of rabies was found. This diagnosis was confirmed by the inoculation of rabbits. The woman was given Pasteur treatment and to date remains healthy. Unfortunately, the bat carcass was destroyed before the genus or species could be determined; however, there was general agreement among the people who saw the bat that it was insectivorous.

These findings have revealed a probable reservoir and source of infection in a new group of wildlife with feeding and living habits entirely different from those of animals heretofore known to harbor rabies virus in this country. As an aid in understanding this new problem, it seems desirable to present a review of bat rabies in Latin America, where the disease has existed for half a century. The designation "bat rabies" is used in the absence of better

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terminology for that form of rabies transmitted by bats and usually occurring in humans and in livestock as paralyses; also occurring in several forms among hemophagous and frugivorous bats of Latin America.

History and Distribution

The existence of rabies among bats was first recognized in Brazil during investigations of a paralytic disease among cattle, erroneously called "mal de caderas de bovinos," which had appeared as an epizootic in 1908 along a narrow strip between the mountains and the sea. Pawan (*2*) cited Carini's discovery in 1911 of Negri bodies in the brains of cattle dying of this paralytic disease, which was epizootic in the state of Santa Catarina. At the beginning of the outbreak, the inhabitants of Santa Catarina noticed that, although bats are normally nocturnal animals, many were seen flying about and biting animals during the daytime. Carini emphasized that bovines bitten by such bats invariably developed "mal de caderas," and bats were suspected as being the carriers of this disease. Bats could not be obtained for examination, and, when the disease was diagnosed as rabies, dogs were suspected of being responsible for its spread.

Sporadic cases of rabies had occurred among dogs in the infected area simultaneously with the cattle disease with the result that a dog quarantine was strictly enforced, and almost 7,000 dogs were killed in 6 months in 1912. The paralytic disease of cattle continued unabated. Observations revealed that the disease was usually found near forests. It was also noted that rivers, which were impassable to dogs, offered no barrier to the spread of the disease in cattle.

Other Latin American Epizootics

Pawan (*2*) records that while Haupt and Rehaag were studying "mal de caderas" in the town of Blumenau, in southern Brazil, from 1914 to 1921, they were impressed by the unusual behavior of bats: flying in the daytime, fighting among themselves, and attacking animals. They concluded that such abnormal aggression and fits among the bats must be signs of disease. The inhabitants of the Blumenau area had observed that the animals bitten by bats during the daytime invariably died, and they were convinced that vampire bats, because they were known normally to feed on cattle, were responsible for the spread of "mal de caderas" in cattle.

In 1916, Rehaag isolated rabies virus from a fruit-eating bat (*Phyllostoma supercilliatum*) caught while biting cattle during the daytime. He found Negri bodies in rabbits and guinea pigs which he infected with this rabies virus. During the studies on the epizootic, it was noted also that destruction of dogs in the area had no limiting influence on the disease among cattle.

Pawan (*2*) reported that after these discoveries were made Haupt and Rehaag concluded that the repeated epizootics of paralytic disease in the livestock of southern Brazil were caused by rabies virus which was being transmitted by bats.

In Trinidad

The disease continued to spread on the South American continent and, in 1925, appeared among cattle in Mucurapo and Saint Anns in northern Trinidad, where it was again erroneously diagnosed, this time as botulism (*3*). During the next few years, other investigators in Brazil, Paraguay, and Argentina concluded that rabies virus caused the paralytic epizootics among the livestock of South America (*4*).

Until 1929 all rabies suspected of being transmitted by bats had occurred only in animals, but suddenly there appeared in the village of Siparia in southern Trinidad an epidemic of ascending paralytic myelitis in humans which Hurst and Pawan (*4*) found to be caused by the virus of rabies. During this epidemic, authentic accounts were given of bats flying from fruit trees and attacking humans and animals. The probability is that these bats were fruit-eaters and were rabid. The paralysis associated with the disease in humans and in cattle, together with the history of bat bites in both, led to the suspicion that blood-lapping bats were transmitting the disease, despite the evidence that vampire bats had been feeding on humans in Trinidad for some 60 years. Pawan (*2*) in 1936 reported results of investigations which showed that vampire bats do transmit rabies in both humans and livestock.

Pawan (*2*) found circumstantial evidence that bat rabies may have occurred in Trinidad prior to the 1925 outbreak:

> Records of the Trinidad colony indicated that in the distant past attempts to establish stock farms in the areas near the villages of San Francique and Siparia had failed because of the ravages of bats.
>
> While dissecting vampire bats to determine the nature of their stomach contents, in 1889, a chemist developed a fatal paralysis which was certified as "acute ascending spinal paralysis."
>
> In the continued absence of recognized rabies, in 1919, a peasant girl and woman were bitten on the lower extremities by a "strange mad cat." Six weeks later, each developed a severe burning sensation at the site of the wound, and paralysis followed. Death occurred 3 days after the onset of symptoms.

In Mexico

Bat rabies was recognized in Mexico during studies of a highly fatal paralytic disease of livestock, which had been prevalent for nearly half a century in the west coastal states of Mexico (*5*). This disease was called "derriengue," or "el tronchado," and during the last decade it appeared to be the major livestock problem in parts of Mexico. There were at least 10,000 cases of derriengue in cattle yearly between 1939 and 1943. Johnson (*5*) reported than Ten Broeck, and later Johnson himself, isolated rabies virus from the salivary glands and brain of a paralyzed cow and from the salivary glands and brains of vampire bats (*Desmodus rotundus murinus* Wagner) in the area of the disease. Dogs did not appear to be associated with the transmission of derriengue. Málaga-Alba (*6*), in 1953, reported bat rabies from several other parts of the country. Positive laboratory diagnosis has been made of bat rabies in three states, Sonora, Chihuahua, and Tamaulipas, which border on the United States. The disease now occurs in most of the states of Mexico.

In Honduras

Schroeder (*7*) diagnosed vampire bat rabies as "derriengue" while investigating cattle losses at La Ceiba, Honduras, in 1950. He confirmed rabies by mouse inoculation in 6 of the 7 cattle studied. Negri bodies were found in the brain of the seventh animal, but mice inoculated with this brain material failed to yield virus.

In Venezuela

Briceno Rossi (*8*), in 1953, reports the existence of paralytic rabies in cattle in various stock-raising areas of Venezuela where the disease occasionally takes epizootic form and is transmitted by vampire bats. The bovine-type virus has been isolated from dogs, but dogs have not been implicated in transmitting the disease. There is no evidence of the disease in humans in Venezuela.

The Virus Isolated from Bats

The rabies virus isolated from bats has been shown by pathological findings, animal inoculation, complement fixation, cross-neutralization, and protection tests to be closely related to classical strains of rabies virus (*2,5*). It has been likened to the virus of the "oulo-fato" form of rabies found in indigenous dogs of French West Africa in that both viruses usually produce the paralytic form of rabies (*9*).

In studies of the clinical course of rabies in bats, Pawan (*10*) used a human strain of virus which had produced the paralytic form of rabies, but upon subcutaneous inoculation into vampire bats it produced both the furious and the paralytic forms of the disease. Pawan demonstrated that the Trinidad virus travels readily to the salivary glands in bats, the saliva sometimes becoming highly virulent as early as 7 days following subcutaneous inoculation, while the bat itself may manifest no sign of disease.

The species specificity of the virus maintained in bats has been altered as is true of rabies virus subjected to extended propagation in the experimental and laboratory animals (*5*). The slight differences which appeared in Johnson's neutralization and protection tests may be explained somewhat by the low infectivity index of freshly isolated rabies virus and the high infectivity of brain tissue infected with fixed virus. Rabbits immunized by Hurst and Pawan (*3*) with killed fixed virus were protected against subsequent injection of Trinidad

vampire bat virus, but, on the other hand, the Trinidad virus did not confer much resistance against fixed virus.

In addition to the animals mentioned previously, bat rabies virus has been experimentally transmitted to guinea pigs, cats, rats, mice, dogs, hens, and buzzards. After intracerebral injection, dogs developed paralysis, in the posterior limbs first, and some of them showed a tendency to bite (*11*). Hurst and Pawan (*3*) report the paralytic form of rabies in rabbits following intracerebral injection, although Van Rooyen and Rhodes (*11*) record that Remlinger and Bailly noted a fairly long stage of motor excitement before the onset of paralysis. Van Rooyen and Rhodes reported that Andrews had shown the guinea pig to be more susceptible to the Trinidad virus than to ordinary rabies virus.

Hurst and Pawan (*3*) made extensive histological studies of the brains and spinal cords of monkeys and rabbits which were experimentally infected in Trinidad. They observed that infection of monkeys with the Trinidad virus may give rise to very scanty cellular lesions, detectable only on very careful examination, or to marked inflammatory and parenchymatous changes scattered diffusely over the central nervous system. There also seemed to be a third group showing lesions of intermediate severity between the very scanty changes in the first group and the intense changes in the second. In the cortex of all groups, small compact microglial foci occurred, formed in many cases around a degenerate nerve cell. The cerebrum showed meningeal infiltration, perivascular cuffing, and well-developed microglial foci. When definite lesions were found in the brains, marked changes were seen also in the spinal, gasserian, and sympathetic ganglia. Many nerve cells were degenerate, or actually necrotic, and were often replaced by capsular cells. Negri bodies were found regularly in the experimental disease of monkeys.

The Nature of the Disease

Bat rabies occurs in nature in humans, in herbivorous animals, and in hemophagous and frugivorous bats. Rabid dogs have been seen frequently in areas where bat rabies was epizootic, but the dogs could not be connected with these epizootics. Natural infection has not been reported in dogs except in Venezuela where bat rabies virus has been isolated from dogs (*8*).

The average incubation period in *D. rotundus* is 25 days, but one bat showed probable symptoms on the third day following inoculation and then returned to normal until the seventh day when definite rabies symptoms appeared (*10*). The longest known incubation period was in a vampire bat which was infected in nature prior to capture and which remained infective without symptoms for 5½ months. At the end of this period, its brain was removed and was injected subcutaneously into guinea pigs, producing rabies in them. Pawan (*10*) reports that in 1934 Lima showed that *Desmodus* which had been infected experimentally with bovine virus can remain infective without evidence of disease for 1 to 5½ months. The average length of life of the frugivorous bats (*Artibeus*) following inoculation with rabies virus was 130 days.

Six forms of rabies in *Desmodus* bats were observed and classified by Pawan (*10*) as follows:

> The typical classical furious rabies in which fury is a prominent and predominating feature, followed by paralysis and death.
>
> The typical paralytic form of rabies, in which no state of fury or excitement can be observed, but in which paralysis runs into death.
>
> A furious type of rabies, in which the stage of fury is followed by recovery.
>
> A furious form in which fury runs on directly to death with no intervening paralysis.
>
> A form in which the bat is well but dies suddenly and unexpectedly without any previous evidence of illness.
>
> A subclinical or latent form of infection, in which the bat continues to live without any apparent departure from normal.

The Classical Form

In the classical form of bat rabies, there is the usual incubation period, a prodromal or invasive stage, then a stage of excitement, and

lastly paralysis, ending in death. The prodromal stage of from 12 to 24 hours' duration may be seen when the bat is restless, easily irritated, and there are muscular tremors, or the bat may be apathetic and off feed. This stage is rapidly followed by excitement, fury, and various signs of deranged behavior. Paralysis may first appear as a paresis of one limb or may develop suddenly as a "stony" paralysis. It most commonly involves the wing muscles and those controlling the bladder, producing incontinence of urine. The duration of paralysis is from 1 to 5 days, and in its main features it suggests the disease as seen in other animals and humans.

The predominant symptom observed in frugivorous bats is deranged behavior, during which time they may bite other animals. As with the blood-lapping bats, fruit-eating bats may be refractory to clinical infection with rabies virus; however, the saliva of infected bats may contain the virus when they manifest no evidence of disease (*12*).

The Paralytic Form

The paralytic form of rabies is usually seen in cattle which have been infected by bats. It is characterized by an initial period of restlessness and excitement which is soon followed by a sudden onset of paralysis of the rear quarters. The common name for this disease in Mexico, derriengue, is derived from the Spanish word meaning a break in, or an injury to, the spine (*5*). Affected animals ordinarily live for several days; during this time paralysis extends to the forequarters and neck. Salivation is noted early and results from a difficulty in swallowing.

Emaciation develops rapidly, and the disease seems to be uniformly fatal. The sudden onset of posterior paralysis and the rapid extensive emaciation seem to be almost pathognomonic. The loss of cattle during an epizootic may be high. Johnson (*5*) reported that when derriengue appears in epizootic proportions it may kill 20 to 50 percent of the cattle in the immediate area, and Schroeder (*7*) reported that single ranches in Honduras lost as much as 40 percent of their cattle over a 4-month period during an epizootic.

Symptoms in humans appear suddenly, usually 3 to 4 weeks following the bite of an infected bat. The first complaint is usually a burning or tingling sensation in the bitten limb, and there may be paresis in the affected limb at the onset of the disease (*11*). The patient is febrile and often has a headache. Following these prodromal symptoms, which may last from 1 to 4 days, muscular weakness progresses to complete paralysis of the affected limb. The trunk muscles and arms are soon involved, terminating in a fatal paralysis usually about the seventh day after the onset of symptoms.

Epizootiology

The incidence of bat rabies is cyclical, and the disease in both humans and animals occurs in epidemic form. The outbreaks, usually confined to relatively small areas, are frequently limited to valleys and arroyos which are inhabited by vampire bats. In Trinidad, however, the animal disease occurred in large numbers over the entire island at one time or another between 1925 and 1935, while the human disease remained confined to a few small areas (*13*). The epizootics usually end in from 1 to 2 months, followed by the appearance of sporadic cases for several months in the area. Subsequently, the disease may entirely disappear for 1 or 2 years before another outbreak.

Seasonal Occurrence

Seasonal distribution is quite constant, the incidence peaking in January and February, with most of the cases in 1 year occurring between October and April (*5*). This seasonal occurrence may be traced to the breeding habits of the bats. The first sign of an approaching epizootic is the existence of the disease in vampire bats (*Desmodus*), as evidenced by an increase in the frequency with which they bite humans and animals. In epidemics, the animal disease has invariably preceded the appearance of the disease in humans.

The Nonhemophagous Bats

The nonhemophagous bats have not been considered as transmitters of rabies to other animals and humans, although the disease has been recognized in four genera which were infected in nature. Pawan (*2*) reports that Rehaag first recognized rabies in the *Phyllostoma supercil-*

liatum, a fruit-eating bat. Pawan (*2*) later recognized the infection in the *Artibeus*, the *Hemiderma*, and the rare *Diclidurus*, all three of which he classified as frugivorous and insectivorous. Johnson (*5*) has listed the *Hemiderma* as insectivorous. Colin Campbell Sanborn, curator of the Chicago Natural History Museum, states that the *Phyllostoma*, *Artibeus*, and *Hemiderma* (in current terminology, *Carollia*) are fruit-eating and are not insectivorous.

Although the nonhemophagous bats have not been considered of major importance in the transmission of bat rabies to humans and animals, these bats have been found attacking animals when they were deranged with rabies, and they may transmit the disease. The frequency with which rabies infection has been found in the nonhemophagous bats during epizootics among the blood-lapping bats and livestock leads to a strong suspicion that they play a very important role in either harboring rabies virus or in transmitting it to the hemophagous bats and perhaps to animals.

Desmodus, the Transmitter

The hemophagous vampire bat, *Desmodus*, is the proved transmitter of bat rabies to humans and animals. The vampire bats (*D. rotundus murinus* Wagner and *Desmodus rufus* Weid) are a constant threat as a source of infection because of their normal feeding and living habits. They live in large colonies within easy flying range—usually about 1 mile—of the animals upon which they feed. Blood is obtained from the host through a typical crater-like wound, upon which several bats may feed at the same time, and they frequently return to the same host on successive nights. After feeding, they rest in various hiding places, which may be frequented by nonhemophagous bats, before returning to their usual roosting places.

The known habitat of the vampire bat is from the 30th parallel south latitude to the 28th parallel north latitude, or, from just north of Uruguay in South America to just north of Cuidad Victoria, Tamaulipas, Mexico, in North America. The many reports of bat rabies in widely separated parts of this area indicate that this disease presents a problem in all areas inhabited by the vampire bats.

Control of the Disease

Control activities should be directed toward the destruction of vampire bats or any other bat known to harbor and transmit rabies virus. Bat populations near villages or other thickly populated areas can be successfully limited by destruction of the colonies.

Limiting the bat populations in sparsely settled regions where livestock range over large areas is more difficult and, in some cases, almost impossible. In these areas, livestock may be protected, as is done in Mexico, by moving them 15 to 20 miles from an area in which bat rabies is occurring.

Protection may be accomplished through bat-proofing homes and animal shelters. In some areas, bright lights have been used to keep vampires away.

While the destruction of the blood-feeding vampire bat remains the main objective in antirabies bat campaigns, it should not be forgotten that the nonhemophagous bats may bite animals and transmit rabies. Measures for reducing their numbers should be included in any control campaign.

Immunization

In areas where bat populations cannot be eliminated, susceptible animals can be protected by immunization with rabies vaccine. Vaccination of livestock for the prevention of derriengue was practiced in Mexico before the vampire bat was implicated as the transmitting agent (*5*). An extensive immunization program was begun in 1936, using a vaccine consisting of a 20-percent suspension of infected sheep brain in saline containing 0.5 percent Formalin. In his 1951 annual report on the Mexico-United States rabies agreement, Dr. Aurelio Málaga-Alba, WHO rabies consultant, reported that he successfully used avianized vaccine prepared from the Flury strain, in 1951, to produce a high immunity against challenge with the derriengue virus. Subsequently, he vaccinated 3,500 cattle with this avianized vaccine with no known failures, although other animals in the area which had been vaccinated with brain tissue vaccine contracted the disease. Schroeder (*7*) reported equally good protection in Honduras with the avianized Flury

strain vaccine. Approximately 5,000 cattle were vaccinated intramuscularly in an area where bat rabies was epizootic, and none of them came down with rabies, whereas the incidence of rabies continued high in unvaccinated cattle.

Discussion

Bat rabies has been occurring in Latin America for half a century or longer and has been recognized as a public health and economic problem of considerable importance in that area for at least two decades. The very nature of the living and feeding habits of the bats which transmit this disease presents a most difficult problem of control. In the United States, there has been little concern that bat rabies would be encountered in this country because the known carrier was confined by climatic requirements to warm areas some distance from the southern border. Since Johnson's original report (*5*), Malaga (*6*) has found the disease in Sonora, Chihuahua, and Tamaulipas, three states in Mexico which border on the United States. Whether infected vampire bats are moving northward or whether the bats have been present in the border areas for a number of years is difficult to determine.

A 1952 survey in southern California by the Pan American Sanitary Bureau resulted in no positive proof of vampire bats in that area, but it did reveal circumstantial evidence of their presence. The evidence indicates that an exhaustive survey in the area is warranted:

> A bat, perhaps a vampire, was observed by a member of the United States Fish and Wildlife Service. It was seen at close range, walking on all fours in the quadrupedal gait typical of vampire bats, and was identified as a vampire from a picture of a *D. rotundus*.
>
> Stabled horses with bleeding ears were found in the morning, on other occasions, and bat bites were suspected when no other definite cause could be found for the bleeding.
>
> Ranchers in northern Baja California, Mexico, were complaining that bats had been damaging the teats of nursing sows. (It is known that when bats do attack hogs they prefer the flanks or mammae.)
>
> There were reports of two cases of paralytic rabies in cattle in San Diego County, Calif., yet there was no history of these cattle having been bitten by other animals or of rabies in dogs or coyotes in the immediate area.
>
> Paralytic cases of a disease resembling rabies, followed by recuperation, have been reported in the area. A case of posterior paralysis was reported in an animal that was ill for several days before it was slaughtered, but the brain was not examined.

The circumstantial evidence of bat rabies in southern California, the spread of derriengue in Mexico, and the recent recognition of rabies infection among insectivorous bats in Florida and Pennsylvania may lead to a change in the concept of a bat rabies problem in the United States.

The Problem in the United States

Because the habitat of the vampire bat is limited by temperature requirements to a warm climate, it is not likely that this bat will present a problem in the United States except, perhaps, in the southern fringe of the country. Insectivorous species which are common in the southern United States are also known to inhabit areas in Mexico from which vampire bats have been reported. It seems likely that rabies could be passed and maintained among these different species. It is also possible that bats could be infected by rabid carnivores and, in turn, could pass the infection on to other bats and animals. The apparently healthy bats in Florida which have been found to be infected with rabies indicate that the disease may be latent and asymptomatic in the insectivorous bat, as has been observed in the hemophagous and frugivorous species of Latin America.

A Limited Study

The behavior of the virus in experimentally infected insectivorous bats was shown in a limited experiment on 41 bats by Reagan and Brueckner (*14*). They successfully inoculated two species of insectivorous bats with rabies virus isolated in mice from the brain of a dog. Five passages were made in the big brown bat (*Eptesicus fuscus*), and the brains from each passage were injected into mice. In the first

three passages, 85 percent of the inoculated bats developed the disease in 4 to 9 days, and Negri bodies were numerous in all bat brains and in all but one of the mice brains. In the fourth and fifth passages, 60 percent of the inoculated bats developed the disease in from 4 to 14 days, and only occasional Negri bodies were noted in each brain of the diseased bats. Negri bodies were found in only one-half of the mice brains from these two passages.

Conclusions can hardly be drawn from this limited study, but it may indicate that the virus is altered as it passes through bats. The infectivity seems to lessen, the incubation period lengthens, and the incidence of Negri bodies diminishes. This is in contrast to the usual host-parasite relationship of the rabies virus, in which the host becomes more susceptible, and the incubation period becomes shorter with increasing passage until the virus becomes fixed.

The present information on rabies in bats of the United States is insufficient to permit more than a conjecture as to the public health problems which now exist or which may develop in this country. Much additional study is needed on the prevalence of rabies infection in bats, the pathogenesis of the disease and the nature of the virus in them, and the transmission of rabies by insectivorous bats to other animals.

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Bats of the United States

By COLIN CAMPBELL SANBORN

IN SPEAKING of any kind of animal it is not possible to generalize with the singular and it is seldom possible with the plural. It can be truthfully stated that bats fly, but there ends the one characteristic that applies to all bats. Their manner of flight, habitat, migration, hibernation, breeding habits, and food preferences are as varied as similar activities among other mammals, for there are many kinds of bats.

The order Chiroptera containing the bats is divided into 2 suborders, 17 families, 215 genera, and an estimated 2000 species and subspecies, so it is not a small group. Bats live around the world, north and south to the limits of tree growth, and up to altitudes of 13,000 feet above sea level. Every faunal area has its population of bats, but in the tropics the greatest diversity of species and abundance of individuals is found. Within the borders of the United States are 3 families—the Vespertilionidae, Molossidae, and Phyllostomidae—16 genera, and 65 species and subspecies.

All are beneficial to man in that they do not interfere with his activities or with his health, and most of them feed entirely on insects. Some bats consume according to estimates, from one-half to their full weight in insects in a day. Although it may not be known if these insects are beneficial or injurious or both, there would most certainly be a great overabundance if there was not some agency to hold their numbers in a reasonable balance. In these days when so much is published about controls of so many things, it should be remembered that bats are a major factor in controlling the insects.

Mr. Sanborn is curator of mammals at the Chicago Natural History Museum with which he has been associated for the past 30 years. He is a member of the board of directors, American Society of Mammalogists, and was called to Florida to serve as a special consultant on bat rabies during the investigations described by Dr. Courter on p. 9 of this issue.

Study of Bats

Because the habits of bats are such that they are not easily studied, there are many long gaps in our knowledge of their life histories. Some colonial species living in large groups in caves, old buildings and other accessible locations have been studied, and considerable data have been assembled on their hibernation and reproduction. The recapture of bats marked with numbered metal bands on the forearms has supplied information on their age, sense of direction, migration, and power of flight. In fact, bat-banding has provided more information on the ecology of these mammals than any other method of study, but there is still a great deal more to learn about them. There are not enough students engaged in bat-banding, and recoveries have been too few, but it is a growing field of research and one with great possibilities. The book entitled "Bats" by Glover M. Allen is a most useful introduction to the study of these mammals (*1*).

Echo Location

By registering the voices of bats that are pitched too high for the human ear, it has been learned that some species become aware of obstacles in their line of flight by echo location. The sounds he makes are echoed and picked up by the bat. This has been called radar and sonar, but echo location is the best name for this ability. It is undoubtedly possessed by all the insectivorous bats that feed on the wing although experiments have been made on only a few genera.

Characters of Bats

Only the external characters of bats will be considered in this account as a means of identification. The only measurement used will be the length of the forearm because it is easily taken and more satisfactory for the student than trying to measure the total length of the bat. This method was adopted by Burt and Grossenheider in their field guide to the mammals, a very useful book with numerous colored illustrations and helpful distribution maps (*2*).

Many bats may be identified from external appearances, but it is in the skull and teeth that the more important characters are found. For example, bats have from 20 to 38 teeth, 4 of which are canines, but the number of incisors, premolars, and molars varies. Two bats could have the same total number of teeth but different numbers of various kinds of teeth; or the teeth could be of different shapes and sizes. No species has 22 teeth. The skulls also differ from each other; one species of bat has a ridged skull, and another species has a skull without

Key to the vampire bat of Mexico and to the 36 species of bats in the United States

Family, genus, and species	Popular name	Distinguishing character	Customary habitat	General distribution
Desmodontidae: *Desmodus D. rotundus murinus.*	Vampire bat.	No tail or tail membrane.	Caves, buildings.	Mexico, *not* in the United States.
Vespertilionidae	Simple-nosed bats.	Tail complete and contained in membrane; no growths on nose.	Predominately cave-inhabiting.	All the States.
Myotis	Little brown bats.	Bicolor; small size; long, pointed tragus.	Caves, buildings.	All the States.
M. lucifugus and 3 races.	Little brown myotis.	Fur glossy.	Caves, buildings.	Most of the States.
M. yummanensis and 2 races.	Yuma myotis.	Fur not glossy.	Caves, buildings.	Western States.
M. velifer and 1 race	Cave myotis.	Large size.	Caves, buildings.	Southwestern States.
M. keenii and 1 race	Keen's myotis.	Ears long.	Caves, buildings.	Northeast half and northwest coast.
M. evotis and 1 race	Long-eared myotis.	Ears longer.	Caves, buildings.	Western States.
M. thysanodes	Fringe-tailed myotis.	Tail membrane edged with hair.	Caves, buildings.	Western States.

ridges. Miller (*3*) classified all the families and genera on cranial and dental characters. Therefore, in collecting bats for future identification, the skull should be damaged as little as possible or not at all.

The Simple-Nosed Bats

In the United States, the Vespertilionidae—bats with simple or plain noses, with no leaves or other growths—is the family of bats with the most representatives. They may be further recognized by the complete membrane between the legs which supports a tail extending to its edge. There are 10 genera and 55 species and subspecies of the Vespertilionidae living in the United States. The members of this family are insectivorous, and most of them feed on the wing.

The Little Brown Bats, the Myotis

Of all the Vespertilionidae, the little brown bats, or the myotis—to use their generic name as a common one, are among the best known, are most widespread and have the greatest number of kinds. They are predominantly cave-inhabiting bats, living in caves, old buildings, and attics. Some species winter in caves in enormous numbers.

In the United States, there are 13 species and a total of 27 subspecies. They are small bats with a forearm length of about 1½ to 2 inches. The hair pattern in most is bicolored (dark bases, paler tips). The general color is dark

Key to the vampire bat of Mexico and to the 36 species of bats in the United States—Continued

Family, genus, and species	Popular name	Distinguishing character	Customary habitat	General distribution
M. volans and 2 races.	Long-legged myotis.	Short ears; small feet.	Caves, buildings.	Western States.
M. californicus and 2 races.	California myotis.	Like Yuma myotis, but feet smaller.	Caves, buildings.	Western States.
M. subulatus and 2 races.	Small-footed myotis.	Black mask on face; size small.	Caves, buildings.	West and northeast.
M. austroriparius	Mississippi myotis.	Fur thick, woolly.	Caves, buildings.	Mississippi Valley and southeast.
M. grisescens	Gray myotis.	Wings rise from base of tarsus.	Caves, buildings.	Northeast through central States.
M. sodalis	Indiana myotis.	Fur tricolor.	Caves.	Northeast and midwest.
M. occultus	Arizona myotis.	Color ochraceous.	Caves.	Southwest.
Eptesicus fuscus and 3 races.	Big brown bats.	Large size; heavy build; brown color.	Caves, buildings.	All the States.
Nycticeius humeralis	Evening bat.	Ears thick and leathery.	Buildings, hollow trees.	East and southeast.
Pipistrellus subflavus.	Eastern pipistrel.	Small; yellowish.	Caves, buildings.	Eastern States.

gray or brown except in some dark northwest races and paler desert forms. A number of species may occur in the same area, and the problem of distinguishing between them is often rather difficult. Most of them should be sent to a specialist for determination as the skull may have to be examined. The color, the small size, and the long-pointed tragus will identify the genus.

Both sexes hibernate or winter together. Copulation takes place in the fall and also in the spring, but fall-inseminated females can produce young in the spring without further insemination. A change in the temperature of the wintering cave may cause some of the population to move to another cave. In spring, the sexes separate; the females go to a different cave to bear their young, and the males leave for other retreats. Each female bears 1 young, sometimes 2.

The American members of the genus *Myotis* were revised in 1928 by Miller and Allen (*4*).

Key to the vampire bat of Mexico and to the 36 species of bats in the United States—Continued

Family, genus, and species	Popular name	Distinguishing character	Customary habitat	General distribution
P. hesperus and 4 races.	Western pipistrel.	Small; grayish.	Caves, buildings.	Western States.
Corynorhinus macrotis.	Eastern big-eared bat.	Ears large; 2 lumps on nose.	Caves, buildings	Southeast.
C. rafinesquei and 3 races.	Western big-eared bat.	Ears large; 2 lumps on nose.	Caves, buildings.	Western and central midwestern States.
Antrozous pallidus.	Pallid bat.	Very large ears, not joined.	Caves, buildings.	Western States.
Lasionycteris noctivagans.	Silver-haired bat.	Black; white tips on fur.	Under bark of trees.	All the States except deep south.
Lasiurus.	Red and hoary bats.	Tail membrane furred on upper side.	Trees and bushes.	All the States.
L. borealis and 1 race.	Red bat.	Red color.	Trees and bushes.	Eastern two-thirds of the United States; California; Arizona.
L. seminolus.	Seminole bat.	Mahogany brown.	Trees and bushes.	Gulf coast.
L. cinereus.	Hoary bat.	Large; yellow brown.	Trees and bushes.	All the States.
Dasypterus intermedius and D. floridanus.	Yellow bat.	Yellow; tail membrane haired on basal half.	Trees and bushes.	Gulf coast and Florida.
D. ega.	Western yellow bat.	Yellow color, etc.	Trees and bushes.	Southern California.
Euderma maculata.	Spotted bat.	Long ears; white spots on back.	Unknown.	Western States.

Myotis lucifugus

The little brown myotis (*Myotis lucifugus*) ranges over all eastern United States, south to Florida and northwest into Alaska. A dark race (*alascensis*) is found from southern Alaska to northern California and west into Montana and Idaho. A paler race (*carissima*) exists in the semiarid west from Montana to the California Sierras and eastern Oregon. A pale buffy desert race (*phasma*) occurs in the Great Basin of California and Colorado. These myotis live in caves, mine tunnels, attics, and old houses. Large colonies have been found wintering in northern Illinois, the caves of southern Indiana, and in Arkansas.

Myotis yummanensis

The Yuma myotis (*Myotis yummanensis*) is slightly smaller than the little brown myotis and has shorter and less glossy fur. It is a western species ranging from the arid Great Basin into eastern Texas. A darker race

Key to the vampire bat of Mexico and to the 36 species of bats in the United States—Continued

Family, genus, and species	Popular name	Distinguishing character	Customary habitat	General distribution
Molossidae	Free-tailed bats.	Tail extends past membrane.	Caves, buildings.	Mainly western and southwestern States.
Tadarida mexicana.	Mexican free-tailed bat.	Small size.	Caves, buildings.	Western States.
T. cynocephala.	Florida free-tailed bat.	Small size.	Caves, buildings.	Gulf coast.
T. molossa.	Big free-tailed bat.	Larger; large ears.	Caves, buildings.	Texas.
T. femorosacca.	Pocketed free-tailed bat.	Forearm, 2 inches.	Caves, buildings.	Arizona; California.
Eumops perotis californicus.	Western mastiff bat.	Very large; forearm over 3 inches.	Buildings and cliffs.	Southern California.
E. glaucinus	Florida mastiff bat.	Smaller.	Buildings.	Miami, Fla.
Phyllostomidae.	Leaf-nosed bats.	Leaf-like growth on end of nose.	Caves.	Southwestern States.
Macrotus californicus.	Leaf-nosed bat.	Ears large.	Caves, buildings.	Arizona, Nevada, and southern California.
Leptonycteris nivalis.	Long-nosed bat.	Large size; no tail.	Caves.	Southern Arizona and Texas.
Choeronycteris mexicanus.	Hog-nosed bat.	Short tail.	Caves.	Southern Arizona and California.
Mormoops megalophylla.	Leaf-chinned bat.	Face short; folds of skin under chin.	Caves.	Southwest border of the United States.

(*saturatus*) lives in the moist northwest, ranging from northern California to southern British Columbia. A form which is intermediate in color (*sociabilis*) is found in Idaho, Montana, eastern California, and on the coast of southern California. This bat has been taken in association with the long-legged (*Myotis volans*) and California myotis (*Myotis californious*) in the roof of an old building in southern California and with the Arizona myotis (*Myotis occultus*) under a bridge. A colony of 1,000 present on the 3d of September under a galvanized iron roof had dropped to 200 on the 23d of September, and all had gone by the 16th of December. A large colony was found at the 100- and 200-foot levels of a mine.

Myotis velifer

The cave myotis (*Myotis velifer*) is larger than the little brown myotis. It has a general color of dull sepia or drab above and is paler on the underparts with pure white hairs on the sides of the belly. It lives in southern California and western Arizona. A paler race (*incautus*) ranges through the arid parts of Texas, New Mexico, and northeast Kansas. It is usually found in caves, sometimes in large numbers. A colony in Riverside County, Calif., was present from May through August.

Myotis keenii

Keen's myotis (*Myotis keenii*) of southern Alaska, British Columbia, and Washington is distinguished by its very long ears, which extend well beyond the nose when they are bent forward. It is less glossy and more buffy in color than the little brown myotis. An eastern race (*septentrionalis*) has a wide range from Arkansas, Missouri, and North Dakota east to the Atlantic coast and north to Canada. It has been found wintering in caves in northern Illinois and Arkansas and was at once noticeable by the long ears.

Myotis evotis

Another western myotis is the long-eared myotis (*Myotis evotis*), which differs from Keen's myotis by its still longer black ears, its contrasting light brown color, and by a fringe of scattered hairs on the edge of the tail membrane. One race (*evotis*) is found in the northwest—Washington, Oregon, and northern California; and a lighter form (*chrysonotus*) is found in the west and southwest. It is not a very common bat; those taken have been found in old buildings—one was found in a tent—but so far it has not been observed in caves or mine shafts.

Myotis thysanodes

The fringe-tailed myotis (*Myotis thysanodes*) is larger than the long-eared species; its ears are shorter, and it is most easily identified by the heavy fringe of hairs on the edge of the tail membrane. It is also western in distribution—from Washington south into Mexico. The fur is buff in color, paler on the underparts. It has been found in old buildings, attics, ruins, and mine tunnels.

Myotis volans

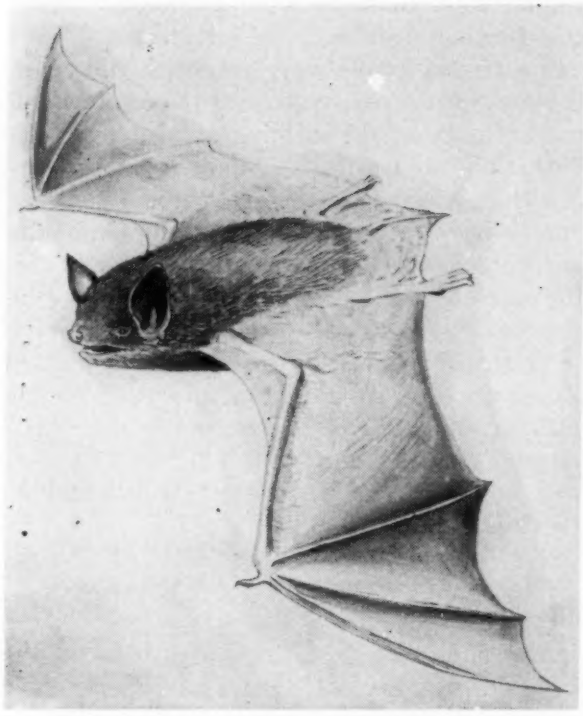
The range of the long-legged myotis (*Myotis volans*) includes all the west coast east to Idaho, Montana, and New Mexico. It is about the size of the little brown myotis but has shorter, rounded ears, a small foot, a keeled calcar, and more fur on the under side of the wing membrane. The northern race (*longicrus*) is smoky brown, and the southern race (*interior*) is ochraceous buff or tawny. There is much variation in the color, however, depending on the amount of wear and the season. It lives in the roofs of old buildings, and young have been found in June.

Myotis californicus

The California myotis (*Myotis californicus*) is much like the Yuma myotis but has a smaller foot and occupies the same general range in the west. A darker form (*caurinus*) is found from Alaska to northern California. The typical race (*californicus*) lives in California and west to Arizona, New Mexico, and Texas but is replaced in the Great Basin by a paler form (*pallidus*). In color, these bats are brown or ochraceous. They have been found roosting in caves, mine tunnels, and old buildings.

Myotis subulatus

The masked myotis (*Myotis subulatus*) is sometimes confused with the little brown myotis but may be distinguished by its black face and ears. The midwestern race (*subulatus*) of



Little brown myotis (*Myotis lucifugus*).

the dry plains, from Kansas and Colorado to Montana, is some shade of buff above and buff to nearly white below. A darker form (*melanorhinus*) is found from Washington south through California and west to Texas. A third race occurs in eastern United States—this is Leib's myotis (*leibii*), and is a cave inhabitant of the eastern States, west to Ohio.

Myotis austroriparius

The Mississippi myotis (*Myotis austroriparius*) is found along the gulf coast from Florida to Georgia and has been recorded as having been found in Tennessee and southern Indiana. Although it is very similar to the little brown myotis, it can usually be identified by the short, thick wooly fur. It lives in caves and old buildings. One or two young are born in May (*5*).

Myotis grisescens

A large heavy-bodied myotis in which the wing is attached to the ankle instead of the side of the foot is the gray myotis (*Myotis grisescens*). The fur is almost unicolor above instead of being darker at the base. Its range is from southern Illinois and Indiana, south to Georgia and Alabama, and west to Missouri and Arkansas. It is a cavedweller and may occupy the same cave throughout the year. A colony of females with small young was found in an Arkansas cave in the middle of June.

Myotis sodalis

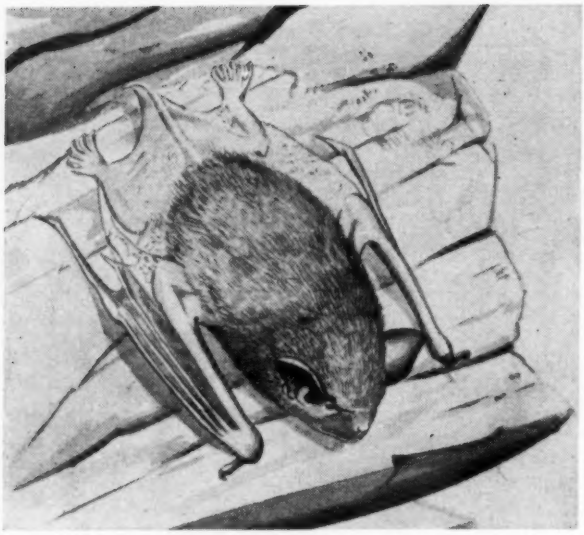
One myotis is known from wintering colonies only, no group of breeding females having been found. This is the Indiana myotis (*Myotis sodalis*) which ranges from Vermont to Alabama and west to Arkansas. It is similar to the little brown myotis, but the foot is smaller and the fur in unworn pelage has a tricolor pattern. This is one of the myotis which has been observed to shift from one cave to another during winter.

Myotis occultus

A colony of the rare Arizona myotis (*Myotis occultus*) was discovered in 1939 in southern California (*6*). Before 1939, it had been known from a few specimens collected in New Mexico, Arizona, and California. This colony was located roosting in crevices on the under side of a bridge. It was under observation from the 20th of April to the 13th of August but had disappeared when a visit was made on the 17th of February. This myotis appears to be in the process of losing one of the small upper premolars—the premolar was absent in 45 of 67 skulls examined. The bat is ochraceous, tawny above and buff below.

The Big Brown Bats

The big brown bats of the genus *Eptesicus* are worldwide in distribution. They are represented in the United States by one species (*Eptesicus fuscus*) which is divided into four subspecies based on color. This bat is found all over the United States, and there is some intergradation between races. The eastern form (*fuscus*) is olive brown above, but the color becomes darker and richer in the Florida race (*osceola*). In the drier parts of the west and the southwest is found a pale form (*pallidus*) in which the underparts are almost white, while on the California coast north to British Colombia lives a dark race (*bernardinus*). It is easily identified by the rounded ears, the



Big brown bat (*Eptesicus fuscus*).

blunt tragus, its color and size, and a forearm about 2 inches long. The bats live in small colonies in caves, attics, and old buildings and hibernate in caves. Eleven females in captivity gave birth to 23 young.

The Evening Bat

Rafinesque's or the evening bat (*Nycticeius humeralis*) is small (forearm, 2 inches) and differs from the myotis by the blunt tragus and the rounded thickened ears. Although it has been taken in Michigan and Illinois, it is more common in the south and ranges to Florida and Texas and west to Arkansas and Missouri. Harper (*7*) records a colony of 50 in Georgia, found in a hole of a dead cypress 45 feet from the ground. This was on the 25th of May; the females had 2 young. Young have been recorded from Alabama and Georgia in the last week of May. We have no notes on hiberation, but we believe it migrates south in winter from the northern States.

The Pipistrels

The pipistrels, called Georgian bats in the east, are among our smallest bats. The forearm length is a little over 1 inch. Besides their small size, they can be distinguished from the myotis by the blunt, rather than pointed, tragus. In the eastern species, the forearm is a lighter color than the wing membrane. Also, the fur is tricolored. The eastern pipistrel (*Pipistrellus subflavus*), yellowish in color, ranges over the eastern half of the country and roosts in attics, old buildings, and caves. Hibernation has been observed in Arkansas earlier than is usual for the myotis; many of this species have been found in a semidormant state early in October. One to three young are produced each year. The western pipistrel (*Pipistrellus hesperus*) is a whitish or yellowish gray with black ears. It ranges from western Texas north to Washington; over this area, a number of slightly different races have been named. It has been found under rock slabs on mountainsides, in crevices of rocks, and in crevices in mine tunnels.

The Big-Eared Bats

The lump-nosed or big-eared bats of the genus *Corynorhinus* are well named, for their ears, which are joined in the middle, are over an inch in height. In front of the eyes are two prominent lumps. The color is a shade of brown with no white spots so this genus cannot be confused with any other bat. The eastern species (*Corynorhinus macrotis*) is confined to the southeastern part of the United States. The western species (*Corynorhinus rafinesquei*) and its races are found over all the west and east through southern Illinois, Indiana, and into Tennessee.

A most complete study of the western bat was published in 1952 (*8*). This reports them roosting in attics and caves, always hanging from wall or ceiling, and never hiding in cracks or crevices. Winter roosts, summer nurseries, and night-resting spots where they retired after feeding, were used. Mating occurred from October through the winter, and young appeared in late May. The young were able to fly in about 3 weeks.

The Pallid Bat

The pallid bat (*Antrozous pallidus*) and its races are similar to the big-eared bats in that they have long ears, but these are not joined and the nose lacks the lumps in front of the eyes. They range over the west, from Washington

south to western Texas. The general color is yellowish. Its intensity depends on the area; it is lightest in desert country and darkest in the northwest. These bats roost in crevices or caves, mine tunnels, and old buildings (a female with 2 young was found in the cavity of a dead cypress in Mexico). The pallid bat appears to be, to some extent at least, a ground-feeder. Some items of its food have been identified as beetles (*Polyphylla*), grasshoppers, scorpions, and the flightless Jerusalem cricket. In fact, one collector reported catching two of these bats in mousetraps set on the ground.

The Tree-Living Bats

Bats of the six genera—*Myotis*, *Eptesicus*, *Nycticeius*, *Pipistrellus*, *Corynorhinus*, and *Antrozous*—are all colonial species living in caves, old buildings, and other sheltered places. Those to be described are all tree-living, hanging singly in bushes or trees or sheltering under loose bark of trees. Three of them are migratory and during migration often appear around buildings. Their ranges cover almost all of the United States.

The first is the silver-haired bat (*Lasionycteris noctivagans*), so named because the almost black fur is tipped with white, giving it a frosted or silvery appearance. Another characteristic is that the upper side of the tail membrane is completely covered with hair. It is often found roosting under the loose bark of pine trees. The female bears two young. Some individuals are migratory; 2 were found on board a ship 20 miles off the coast of North Carolina. It has also been reported hibernating in New York State.

The Red and Hoary Bats

There are two other tree-living bats in which the upper side of the tail membrane is covered by hair. These are the small red bats (*Lasiurus borealis*), with forearms of about 1½ inches, and the larger hoary bat (*Lasiurus cinereus*) whose forearm is more than 2 inches long. Both are solitary species roosting in trees and bushes. Red bats have been seen hanging in sumac less than 3 feet from the ground.

Red Bat (*Lasiurus borealis*).

The red bat is brownish red in summer and duller in winter when the hairs are tipped with white. The gulf coast form is dark, more black than red, and is called the Seminole bat. The western race (*Lasiurus borealis teliotis*) is paler. The eastern form has been recorded from Bermuda in winter and has twice been observed in September on ships off the coast of North Carolina. The red bat has 3 to 4 young. It feeds on insects usually taken on the wing, but a Seminole bat was shot with a cricket in its mouth which it must have taken from or near the ground.

The hoary bat is brown with white-tipped hairs and a buffy throat. It is also migratory, going south in winter. It has two young which sometimes become too heavy for the female to carry. One mother was found on the ground with 2 young weighing 25 percent more than she weighed.

The Yellow Bats

The yellow bats are also tree-living, but in them it is only the basal third of the tail membrane that is furred. They are medium-sized bats (forearm, about 2 inches long) and are yellowish in color. Their range is South America and Mexico, but one species (*Dasypterus intermedius*) ranges along the gulf coast from Texas into Florida. In Florida, *Dasypterus intermedius* is referred to as a Florida yellow

Yellow bat (*Dasypterus intermedius*).

bat (*Dasypterus floridanus*). Another (*Dasypterus ega*) is found in southern California. They are known to have 3 to 4 young. Since they are not easily accessible for study or banding, little has been learned of their habits. They roost in trees and bushes. In Florida during August, they are early flyers, appearing about sunset.

The Spotted Bat

The rarest bat in the United States is the spotted bat (*Euderma maculata*). It cannot be confused with any other bat as the upper side is dark brown and is marked with white at the base of the ears, with a white spot on each shoulder, and with another at the base of the tail. The ears are more than 1 inch in length. The forearm is about 2 inches. The 9 known specimens have been taken in California, Nevada, Arizona, New Mexico, Utah, and Montana. They were found hanging on a fence, on the base of a cliff, on the sides of buildings under the eaves, and dead in buildings.

The Free-Tailed Bats

The *Molossidae* or free-tailed bat is the second family of bats in the United States. The tail, instead of being wholly in the membrane, extends some ways beyond it. The family is represented by 2 genera and 6 species. Caves, old buildings, and attics are all used as roosting places. These bats do not hang from the ceilings or walls but prefer to hide in cracks and crevices. Their presence is marked by a very strong musky odor.

Tadarida mexicana

Best known among the *Molossidae* is the Mexican free-tailed bat (*Tadarida mexicana*) which is the species living in the Carlsbad Caverns, N. Mex. They arrive there early in March, and the colony increases during the summer until early fall when millions are present. Most of them have left by November. The recovery of a banded specimen showed that it had flown 800 miles into Mexico.

Tadarida cynocephala

A closely related species, the Florida free-tailed bat (*Tadarida cynocephala*), is found in Florida and along the gulf coast. A colony studied by Sherman (*9*) was present during the entire year except for a week in March which appeared to be the breeding period. The females each produced one young in June.

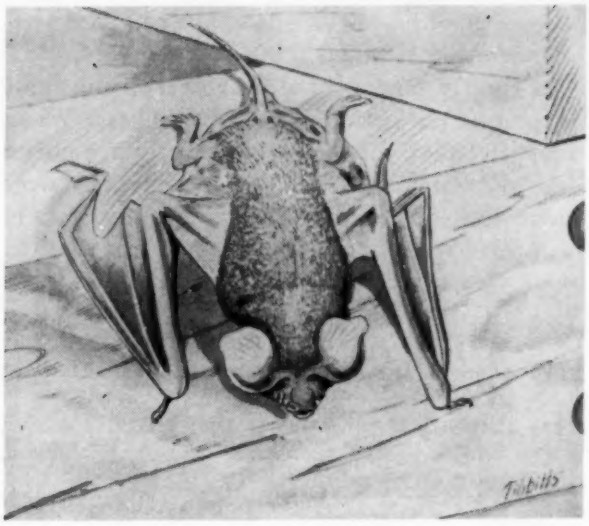
Tadarida molossa

There are two other free-tailed bats of the genus *Tadarida* but neither are found in such large colonies. The big free-tailed bat (*Tadarida molossa*), with a forearm of about 2½ inches, is widespread over South America and into Mexico. One large colony has been reported from Texas, and there are records of single specimens from Iowa and many of the western States. The Texas colony reported by Borell in 1939 (*10*) was found in a crevice of a cliff and was composed of females only. It was discovered in May, when the females were pregnant, and remained until the middle of October.

Tadarida femorosacca

The pocketed free-tailed bat (*Tadarida femorosacca*) is a Mexican species that just extends over the border of the United States where it has been reported from Arizona and California.

All these bats are reported as not leaving their roosting places until after dark. They are also



Free-tailed bat (*Tadarida mexicana*).

known as "guano" bats because the droppings from large colonies form deposits of commercial value as fertilizer.

The Mastiff Bats

The largest of the free-tailed bats are known as the mastiff bats. One species (*Eumops perotis californicus*) is found in southern California and Arizona. The other (*Eumops glaucinus*) is known from a colony in the Miami High School, Florida. It has been present since 1928 but does not increase in size.

The California mastiff bat is the largest bat in the United States. The forearm is over 3 inches long. Its size and large ears easily identify it. It lives in colonies up to 70 in old buildings, attics, crevices of buildings and cliffs. The roosts are usually where the animal has a drop of about 30 feet below it to enable it to take wing. Like other free-tailed bats they fly late and return to the roost in about an hour. It is believed that they leave again for another meal before dawn. The one young is born late in May or June. Howell has published two papers (the second with Little) concerning their habits and young (*11*, *12*).

The Leaf-Nosed Bats

The third and last family of bats inhabiting the United States are tropical species that just cross the Mexican border. All are leaf-nosed bats of the family Phyllostomidae. They are easily identified by a triangular leaf on the top of the nose. They belong to four different genera with relatives in Central and South America and in the West Indies.

The California leaf-nosed bat (*Macrotus californicus*) lives in mine tunnels, caves, and sometimes old buildings in California, Arizona, and Nevada, in colonies up to 500. Their legs are long, and they hang from the ceiling making a half turn in the air when alighting. They are of good size—the forearm is about 2 inches long—gray in color, and have a tail that extends to the edge of the membrane. Items of their food have been identified as moths, grasshoppers, katydids, and harvest flies, some of which must have been taken from the ground. One specimen was taken in a mousetrap. The one young is born in late May or June.

The long-nosed bat (*Leptonycteris nivalis*) has a very long muzzle, as the name implies, and no tail. The ears are small, and the forearm is about 2¼ inches long. Large colonies have been found in the Big Bend National Park region of Texas and others in mine tunnels in

Vampire bat (*Desmodus rotundus murinus*).

Arizona. It is believed to feed on insects from night-blooming flowers because cactus pollen has been found in some of the stomachs examined.

Another leaf-nosed bat resembling the long-nosed bat is the hog-nosed bat (*Choeronycteris mexicanus*). It is smaller than the long-nosed bat; the forearm is less than 2 inches; and it has a short tail half the length of the tail membrane. It may have the same feeding habits, however. It is recorded from mine tunnels in Arizona and from garages and buildings in San Diego, Calif. Young attached to the female were found in July.

The leaf-chinned bat (*Mormoops megalophylla*) has a grotesque face formed by folds of skin across the chin of the short face. It is a cave-inhabiting species and has been recorded from the United States only a few times.

The Vampire Bat

A bat not living in the United States but of particular interest as it appears to be increasing its range to the north is the vampire (*Desmodus rotundus murinus*). It ranges from Uruguay and central Chile north into Mexico. It lives from the seacoast to 11,000 feet above sea level in Peru and over the Andes into the hot jungle where it probably roosts in hollow trees. It has been found in palm-thatched huts in central Brazil.

The vampire has fewer teeth (*20*) than any other bat, and the premolars and molars are functionless. The canines are large, and the upper incisors are large, pointed, and sharp. It is with these that it scoops out a bit of skin from its host and then laps up the blood. Its victims may be fowls, cattle, horses, dogs, people, or other bats.

A tightly screened building or a strong light is the best protection against vampires. When I was in Brazil, I had to tie my horses to a picket line and hang a powerful gasoline lantern over them to keep the bats away. Before that, 14 vampires were found feeding on 1 horse.

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Asphyxiation in Street Manholes

By G. S. MICHAELSEN, B.Ch.E., M.S., and W. E. PARK, M.D.

THE DEATH of a plumbing company employee in a water-main manhole in Minneapolis on June 10, 1952, brought to the fore, for a second time in Minnesota, the danger of suffocation in an apparently innocuous manhole.

The manhole where the death occurred is located on a city street in a low, swampy area. The manhole was a new one—it had been completed on May 26, 1952, to provide a water connection for a new building under construction. Irregularly cylindrical in shape, it has a diameter of about 4 feet and a depth of 9 feet, and is constructed of concrete bricks which are sealed together with mortar. It has, like all manholes, an iron ladder built into the wall and a standard iron cover at street level. The center opening in the cover is about 1½ inches in diameter. The manhole contains only a 4-inch gate valve opening from a 6-inch main.

Account of Death

For approximately 2 weeks preceding the death, some employee of the contractor plumbing company had entered the manhole twice a day—in the morning to turn on the water and in the late afternoon to shut it off. The deceased workman had performed this service himself without any mishap on the 2 or 3 days immediately preceding the accident.

On the morning of June 10, another employee of the company had turned on the water and returned to the surface with no evidence of distress. At the end of the afternoon shift, the deceased entered the manhole and turned off the water. When he did not come up in the expected time, his partner on the surface looked down and called to him. There was no reply. He saw his coworker slumped over in a sitting position.

An ambulance was summoned immediately, and efforts were made to bring the man to the surface. After several fruitless attempts, the inert body was finally removed in about 20 minutes. The workman failed to respond to oxygen and artificial respiration and was pronounced dead by the ambulance physician. The coroner's report attributed the cause of death to asphyxiation.

The cover of the manhole was replaced by workmen after the accident and removed again the next day, June 11, to open the watergate which was then left open. Thereafter the cover remained in place until June 16. The floor of the manhole was dry and appeared to consist only of soil and mortar debris.

This death, like the two deaths which occurred in Winona, Minn., on Friday, October 13, 1950, appeared to be from oxygen depletion (*1*). The circumstances of death were similar

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in that the tragedies occurred in manholes which contained no poisonous gases and where the only opportunity for circulation of air was through the covers. Also, both manholes were located in areas which at one time had been low or swampy. The manhole where the death occurred in Minneapolis, however, was dry, whereas the manhole in Winona contained water.

The death was not reported immediately to the Minneapolis Health Department so that there was no opportunity to get air samples from the death trap at the time of the accident. It seemed incredible that a man should die of suffocation in a manhole which had been entered twice a day for 2 weeks and once on the morning of the accident day without anyone showing signs of distress before the tragedy. Interest in the case was aroused, and it was decided to investigate further. The phenomenon was unusual in that it had occurred in a new, dry manhole.

Determining the Oxygen Level

On June 16, about midday, 6 days after the accident and 5 days after the cover had been last removed, air samples from the manhole were taken for analysis at the State laboratory of the division of industrial health, Minnesota Department of Health. Three samples were collected by lowering a rubber tube through the center hole to the depths of 5, 7½, and 9 feet below the ground surface. The cover was not removed. No combustibles were found, and no odor was present in the samples. This corroborates the testimony of two workmen, who were present at the removal of the body, that there was no odor in the manhole. The findings indicated some oxygen depletion and an increase in carbon dioxide (table 1). The oxygen level, however, after the manhole had been closed for 5 days was still high enough to sustain life, and the cause of death continued to be baffling.

On June 30, at 10 a. m., three more samples of air were taken from the manhole at the same depths (table 1). Then the cover was removed, and a mouse was rapidly lowered in a cage to the depth of 7½ feet. Within 10 seconds the mouse fell over on its side and started to kick. Ten seconds later it had stopped kicking. The cage was then pulled immediately to the surface. The mouse was found to be cyanosed and dead.

A second mouse was quickly lowered in the same way to the floor of the manhole, a depth of 9 feet. It also died in 20 seconds and was equally cyanosed. If conditions existing in the manhole on June 30 had been present on the afternoon of June 10, it would not have been necessary to look further for the cause of the workman's death, because no one could live in air containing so little oxygen—less than 3.2 percent (table 1).

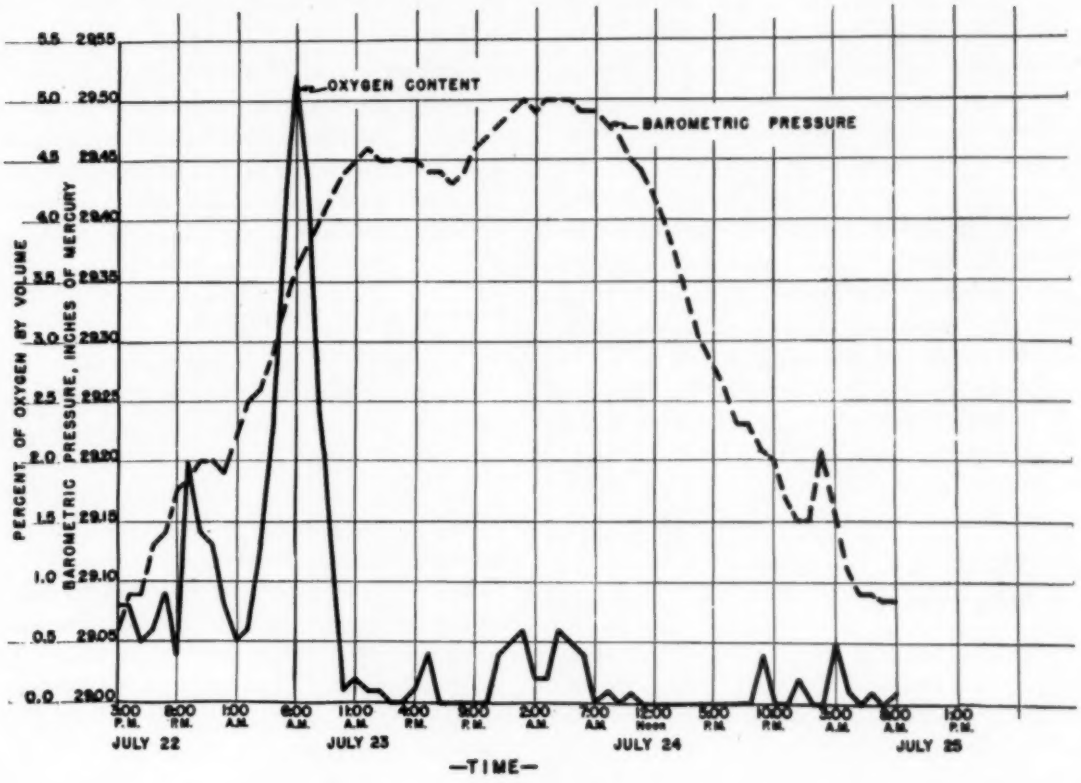
The situation was, however, still puzzling. How could conditions have changed so rapidly that a manhole entered safely in the morning could become a deathtrap by the end of the afternoon shift? Furthermore, how, when it had not been blown out with fresh air in the meantime, could a manhole, which was a deathtrap on June 10 have an oxygen level of more than 16 percent on June 16 and less than 3.2 percent on June 30?

If air contains from 19 to 21 percent oxygen, it is ordinarily considered within the range of normal. The oxygen level may drop as low as 16 percent without producing symptoms of anoxia in man. Levels ranging from 16 down to 6 percent will produce symptoms of oxygen deficiency, ranging from mild to severe, depending on the degree of exertion and other factors. Less than 6 percent is insufficient to sus-

Table 1. Analyses of oxygen and carbon dioxide content of air samples taken at collection points below ground surface

Date and content	Percentages of content by volume at collection points		
	9 feet	7½ feet	5 feet
June 16:			
Oxygen	16. 1	16. 7	17. 5
Carbon dioxide	4. 3	3. 7	3. 0
June 30:			
Oxygen	0	1. 9	3. 2
Carbon dioxide	14. 3	14. 3	12. 4

Figure 1. Studying the influence of barometric pressure—first experiment. Chart shows hourly recordings of barometric pressure and oxygen content at bottom of manhole, 9 feet below the surface, between 3 p. m., July 22, and 8 a. m., July 25, 1952.



tain life, and death from asphyxiation will occur in a few minutes.

Checking Barometric Conditions

A study of barometric pressures reported for the day of the tragedy revealed something significant: During the day of June 10 there had been a rapid fall in barometric pressure, from a reading of 29.99 at 12 noon to 29.93 at 4 p. m. Might this fact account in any way for a rapid fall in the oxygen content of the air within the manhole?

To seek an answer to this puzzling question and to find an explanation for the disappearance of oxygen, testing apparatus for determining oxygen and carbon dioxide content, air motion and air velocity, and barometer pressure was installed in a station wagon. The vehicle was stationed over the manhole and manned for 24 hours a day for 5 days, July 22 to July 26. Samples were analyzed hourly at 3 depths—5, 7½, and 9 feet from the surface. Midway in the experiment, there was a slight change in sampling depths to 3, 6, and 9 feet so that a better study could be made of the air nearer the surface. The water manhole cover was replaced with a sewer manhole cover so that the experiment could be made with more than a single opening in the cover.

Three rubber tubes were inserted to the desired depths. The edge of the cover, the space around the tubes, and the openings not in use were sealed with a mastic compound. A pipe was sealed into the center hole of the cover, and the flow of air into and out of the manhole was measured by a thermoanemometer and recorded. The direction of air flow was determined by introducing smoke in the pipe from time to time.

Hourly readings were taken for the period from 3 p. m. on July 22 to 8 a. m. on July 25. The slight change in sampling depths was made at 11 p. m. on July 23. The data recorded in-

dicated a tendency toward an increase in oxygen content during periods of a rising barometer (fig. 1). More striking was the tendency for the oxygen content to decline during periods of a steady or falling barometer. The oxygen content fell rapidly to a point close to zero during falling barometric conditions.

The flow of air into and out of the open central pipe was extremely variable, flowing in one direction for a short time and then reversing direction. The direction of flow seemed to be influenced by wind velocity and street traffic. The air exchange through the central pipe seemed to influence only the oxygen content in the upper part of the manhole.

At no time during the study did the oxygen content in the bottom of the manhole reach the level found in the June 16 analysis. The highest level recorded was 5.2 percent. This observation led to further experiments.

Blowing With Fresh Air

For the next experiment—the station wagon with its testing apparatus was still on location, and there was no interruption between the readings made for the first test experiment and this one—the manhole was blown out with fresh air on the morning of July 25, and immediate tests showed oxygen levels ranging from 18.8 percent at the bottom of the manhole to 19.3 percent at the 3-foot level. The manhole sewer cover was again in place and sealed as in the preceding experiment. Hourly tests were run during the 30-hour period from 9 a. m. July 25 to 2 p. m. on July 26 (fig. 2), and readings were taken at depths of 3, 6, and 9 feet.

The oxygen content dropped rapidly, particularly at the greater depths, from 18.8 at the beginning of this experiment to 1.4 percent at 3 o'clock on the first afternoon. Thus, in a few hours, the oxygen level dropped from the so-called normal range of 19 to 21 percent to a point insufficient to support life. Here at last it had been demonstrated that in the deathtrap very rapid changes were, on occasion, taking place. If these changes duplicated those which might have occurred on June 10, perhaps herein lay an explanation for the death from suffocation of the plumbing company employee. At the termination of this second experiment, the oxygen level was almost zero: 0.9, 0.1, and 0.3 percent at the depths of 3, 6, and 9 feet. The corresponding carbon dioxide levels were 14.8, 15.2, and 14.5 percent.

However, it was noted that while the oxygen content in the manhole on July 25 was falling rapidly, the barometric pressure was slowly rising, a condition which did not exist on June 10. Perhaps there might be some factor other than barometric pressure which might influence the oxygen and carbon dioxide changes.

Examining Soil Samples

In a further search for the unknown factor causing oxygen depletion in the deathtrap, the manhole was revisited on September 22, 1952, to obtain soil samples.

The manhole was blown out with fresh air before it was entered. Soil, bits of dried mortar, debris, and extraneous material commonly found in filled areas were found in the first 6 inches of surface at the bottom. Beneath this layer there was a very solid material which had the uniform appearance of a sand rock impregnated with oil. The hard material was black and had an odor resembling the oil ordinarily applied to roads. The total depth of the oil-sand-rock and its extent were not determined.

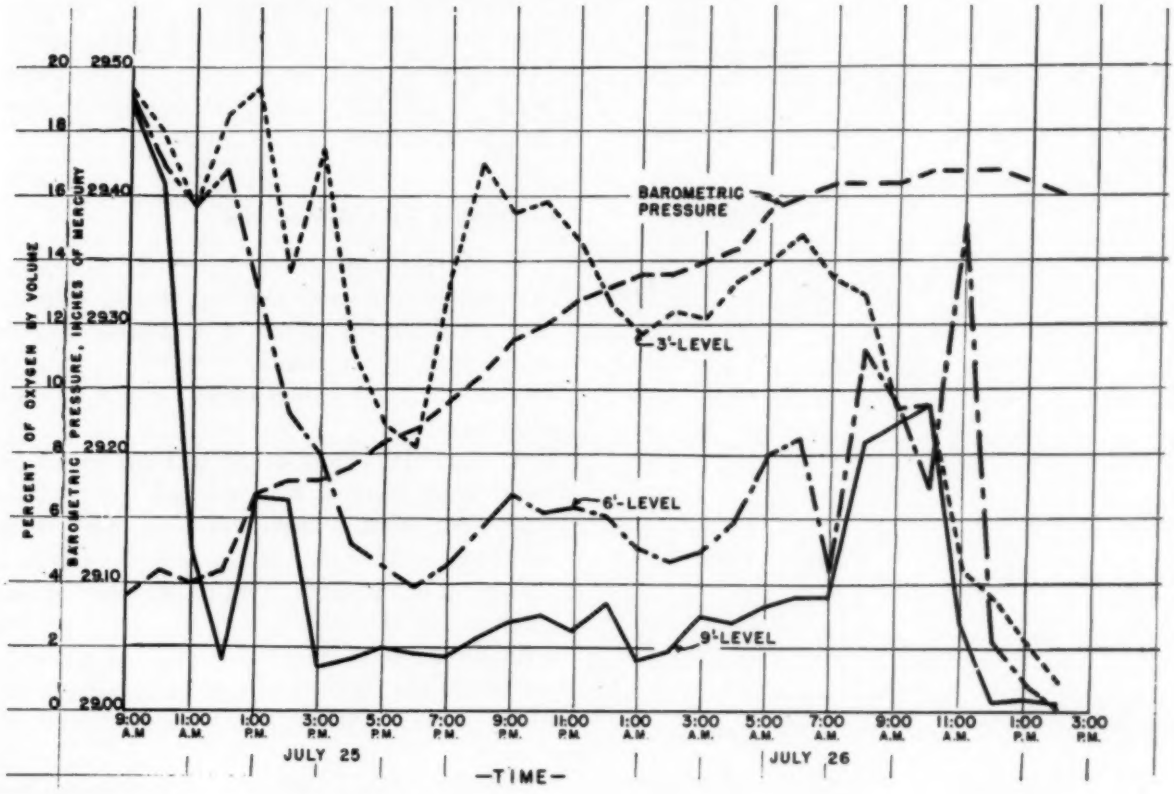
Samples of the oil-sand-rock and of the overlying soil debris were taken to the laboratory. There, samples of clean sand taken from an excavation and of black dirt from a garden were compared with the samples of the oil-sand-rock, and all three were tested for chemical oxygen demand. The results of these tests are shown below:

Samples	*Grams of oxygen per gram of soil*
Oil-sand-rock from test manhole	0.33
Black garden dirt	.12
Clean sand from excavation	0

There was almost no oxygen absorption by the clean sand. The black garden dirt absorbed some oxygen. The hard oil-sand-rock obtained from the manhole had, however, a much higher oxygen demand and produced carbon dioxide. The oil-sand-rock used oxygen at a rate three times as fast as garden dirt and infinitely faster than the clean sand.

The oil-sand-rock was extracted with benzol.

Figure 2. Results of the second experiment—air analysis of deathtrap manhole after it was blown out with fresh air on the morning of July 25, 1952. Barometric pressure and oxygen content at 3-, 6-, and 9-foot levels are shown for every hour from 9 a. m., July 25, through 2 p. m., July 26, 1952.



The residue left after extraction appeared to be sand. When the benzol was evaporated from the extract, a black tarry residue was left. The tarry material appeared to be the substance responsible for the consumption of oxygen and production of carbon dioxide.

The absorption of oxygen and production of carbon dioxide in the manhole were more rapid than would be expected from the rate of oxygen absorption by the hard oil-sand-rock as the process was observed in the laboratory. However, nothing is known about the extent of the oil-sand layer in the vicinity of the manhole. There may be an extensive oxygen-depleted area around the manhole where the oxygen has been replaced by carbon dioxide. If such is true, diffusion of the relatively small amount of air in the manhole into the surrounding subsoil would account for the rapid changes taking place in the manhole. Furthermore, the manhole is located in a relatively low topographic area where there may also be some organic matter in the surrounding subsoil, which might also contribute to the oxygen depletion.

A further examination of the data recorded in the first two studies (figs. 1 and 2) led to the conclusion that, although there is some correlation between oxygen depletion in the manhole and changes in barometric pressure, in this case the important factor appeared to be that there were chemical changes brought about by the oil-sand-rock and by the organic substances in the surrounding subsoil. The effect of changes in barometric pressure was probably through its influence of the pressure rise and fall on the rate of diffusion of air and gases through the walls of the manhole.

Like Sites, Like Findings

The question then presented itself—was this manhole unique or were abnormal oxygen con-

Table 2. Air analysis of 19 manholes in low or swampy areas

Manhole	Carbon dioxide (percent)	Oxygen (percent)
1	0.7	18.5
2	.7	18.0
3	.9	19.1
4	7.2	11.5
5	2.7	16.0
6	5.1	14.3
7	2.8	17.0
8	2.6	17.2
9	8.3	0
10	1.5	19.7
11	7.4	11.0
12	4.5	14.9
13	1.2	19.2
14	.2	20.5
15	3.9	17.0
16	15.1	3.5
17	2.4	18.8
18	6.6	14.4
19	5.0	15.9

centrations a common finding in closed manholes? In order to arrive at some conclusion, a further investigation was undertaken of 44 water main manholes in Minneapolis. They were of similar size and construction. They were dissimilar only in topographic location and in the nature of the surrounding subsoil. Nineteen were in low or swampy areas where the subsoil might be expected to contain a large amount of organic matter. Twenty-five were on relatively high ground and, so far as could be ascertained, in sandy subsoil which might be expected to contain little organic matter.

The same method used in testing the deathtrap manhole was also followed in this experiment. The percentage of oxygen concentration by volume in the group of 19 (see table 2) varied from 0 to 20.5 with an average concentration of 15.1. Two of these manholes contained less than 6 percent oxygen and were, therefore, deathtraps. Four others contained less than 16 percent oxygen, which would be sufficiently low to produce symptoms of anoxia in anyone entering them. Only 4 of the 19 had oxygen levels within the normal range. There was no percentage of oxygen lower than 17.3 in the group of 25 located on higher ground.

These findings led to the general conclusion that the oxygen content of manholes in low and swampy areas can be expected to be considerably below that in the general atmosphere and may drop to dangerously low levels.

Studying a Control Manhole

To clarify further the effect of barometric pressure changes and the rapidity of diffusion through the walls of the typical concrete brick manhole, a study which would eliminate the factor of oxygen absorption by the soil was undertaken.

A manhole, 7 feet deep, on high ground in clean sandy subsoil was selected for this control experiment. The street pavement in the area was similar to that where the death occurred: a brick surface set on a concrete base. Portions of the paved area had been patched with bituminous material. The testing apparatus and the method of collecting air samples were similar to those used in the first two studies.

Hourly readings of barometric pressure were taken over a 27-hour period, beginning at 12 noon on November 3, 1952, and ending at 2 p. m. on November 4. Oxygen and carbon dioxide determinations were made for samples obtained at depths of 3½ and 7 feet. The oxygen levels at 12 noon were 19.4 and 19 percent.

During the first 11 hours of this study, the barometer fell rapidly from 29.53 to 29.05 at 11 p. m. The fall in pressure was reflected in a gradual decline in the oxygen content (from 19 to 18 percent for the same 11 hours). Then the barometric pressure leveled off, and the oxygen content rose to as high as 20.7 percent. This change in oxygen content was thought to represent only the effect of barometric pressure changes. The return of the oxygen content to the normal range was interpreted to mean that in the soil surrounding the control manhole no organic matter or extraneous materials were present to account for the absorption of oxygen. As further proof of this interpretation, a sample of the sand taken from the bottom of the

manhole was analyzed. The chemical oxygen demand was found to be extremely low: 0.008 gram of oxygen per gram of soil.

Table 3. Air analysis in control manhole after filling with nitrogen (samples taken 3½ and 7 feet from surface)

Date and time, 1952	Percentage of oxygen by volume at—		Percentage of carbon dioxide by volume at—		Barometric pressure (inches of mercury)
	7 ft.	3½ ft.	7 ft.	3½ ft.	
Nov. 4:					
4 p. m.	0.2	0	0	0	28.88
5 p. m.	.6	1.0	0	0	28.86
6 p. m.	1.0	1.1	.2	.1	28.84
7 p. m.	1.1	1.2	.1	.4	28.82
8 p. m.	1.4	2.1	.2	.5	28.80
9 p. m.	3.0	3.5	.5	.5	28.77
10 p. m.	3.5	4.3	.4	.5	28.75
11 p. m.	4.6	4.7	.2	.2	28.74
12 p. m.	5.4	5.6	.2	.6	28.74
Nov. 5:					
1 a. m.	6.4	6.5	.3	.4	28.73
2 a. m.	6.9	7.5	.4	.3	28.74
3 a. m.	7.6	7.9	.3	.5	28.74
4 a. m.	8.6	9.4	.7	.6	28.76
5 a. m.	10.6	10.2	.4	.9	28.78
6 a. m.	11.2	11.6	.7	.2	28.80
7 a. m.	11.8	13.0	.3	.7	28.82
8 a. m.	12.8	13.7	.2	.4	28.83
9 a. m.	14.0	14.4	.2	.3	28.85
10 a. m.	14.6	14.7	.3	.3	28.86
11 a. m.	15.5	15.5	.2	0	28.85
12 noon	15.1	16.1	.2	.2	28.85
1 p. m.	16.7	16.6	.3	.2	28.85
2 p. m.	17.0	16.6	.2	.3	28.86
3 p. m.	16.5	16.8	0	.3	28.89
4 p. m.	16.9	17.1	.1	.3	28.91
5 p. m.	17.3	17.8	0	.2	28.94
6 p. m.	17.9	18.2	0	.2	28.97
7 p. m.	17.5	18.0	.1	.1	28.98
8 p. m.	18.0	18.2	0	.8	28.98
9 p. m.	18.3	18.4	0	0	29.00
10 p. m.	18.3	18.3	0	0	29.02
11 p. m.	18.4	18.2	.2	0	29.04
12 p. m.	18.2	18.8	0	0	29.07
Nov. 6:					
1 a. m.	19.0	19.0	0	.2	29.08
2 a. m.	19.0	19.0	0	0	29.10
3 a. m.	18.8	19.2	0	0	29.12
4 a. m.	19.0	19.0	0	0	29.14
5 a. m.	19.0	19.0	0	0	29.18
6 a. m.	19.0	18.9	0	0	29.20
7 a. m.	19.3	19.6	0	0	29.00

Displacing Air With Nitrogen

To determine in some measure the rapidity with which oxygen would be restored to normal by natural means, the oxygen in the control manhole was reduced to zero by displacing the air in the manhole with nitrogen. Immediately after the introduction of the nitrogen, all holes in and around the cover were sealed. Air samples were taken through rubber tubes, as in the earlier experiments, and at depths of 3½ and 7 feet. The oxygen content rose rapidly and steadily from zero to 19.6 percent in 24 hours. During the period of study, which began at 4 p. m. on November 4, 1952, and ended at 7 a. m. on November 6, the barometric pressure dropped steadily from 28.88 to 28.73 at 1 p. m. on November 5, and thereafter rose steadily to a high of 29.20 at 6 p. m. on November 6 (see table 3). There were no measurements made of air velocities in and out of this manhole because it was completely sealed, thereby preventing entry of atmospheric oxygen.

This final experiment demonstrated the rapid diffusion of gases through the walls and floor of a manhole into the surrounding soil and from the surrounding soil into the manhole. It further indicated that where a manhole is constructed in soil which has a low oxygen demand, the natural process of diffusion may be expected to maintain the oxygen content of the manhole at near the acceptable range of 19 to 21 percent.

Summary and Conclusions

This series of experiments emphasized the dangerous conditions that might be found in manholes with respect to oxygen depletion and the necessity for caution and adequate ventilation before entering or working in such places. No manhole should be considered safe until it has in some way been demonstrated to contain sufficient oxygen or has by some mechanical means been freshly blown cut with fresh air.

It may be generally concluded that changes in barometric pressure are relatively minor factors in altering the oxygen content of air in manholes and that the presence of organic matter and other extraneous materials which have a chemical oxygen demand is a factor of major importance.

Four specific conclusions, however, were reached: Manholes, particularly those in low or swampy areas, are potentially dangerous in respect to oxygen depletion. There may be substances in the subsoil other than vegetable matter which may increase the chemical oxygen demand. There is free and rapid diffusion of gases through the walls and floor of manholes. The flow of air through the manhole cover openings is ineffective under all conditions in maintaining the air within the manhole in equilibrium with the outside air.

Further study of this subject might be indicated since this investigation in Minneapolis was not exhaustive. The effect of such factors as change in seasons, frost, rainfall, traffic load, and variations in type of street surfaces might bear investigation.

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Dermatitis in the Poultry-Dressing Industry

Although available statistical data are meager, investigators in the occupational health field are of the opinion that dermatitis is a factor in the poultry-dressing industry by virtue of hazards present in that trade. Some of these hazards are:

(1) Trauma—Such as cuts and abrasions which can occur from the use of knives or from the claws and the hardened feather quills.

(2) Bacterial Infections—Such as erysipeloid, tularemia and brucellosis.

(3) Fungous Infections—These may be rarely transmitted from the fowl itself. Monilial infection can occur as a result of constant moist environment to which the men are exposed.

(4) Parasitic Infestations—The chicken mites and chicken lice are well known to attack human beings and cause definite cases of dermatitis.

The precautionary measures recommended in such cases are as follows:

(1) Those individuals working in wet environments should be provided with boots or rubbers and rubber aprons in order to avoid standing or coming in contact with wet floors, trays, and counters during the course of the work day.

(2) Those who are handling the live fowls should wear coveralls which are designed to protect the extremities, both upper and lower, and which, when worn properly, fasten around the neck. These individuals should also wear washable cotton or other fabric gloves which can be laundered at least once a week.

(3) Individuals exposed to the entrails should, if possible, wear rubber gloves; if gloves are not feasible, they should at least be provided with strategically placed washing facilities which can be used with relative frequency.

(4) All cuts and abrasions should be promptly washed and sterilized with 70 percent alcohol or one of the other types of local antiseptics.

Industry's Concern in Pollution Abatement And Water Conservation Measures

By LEONARD B. DWORSKY, B.S.

POLICY DETERMINATIONS and actions of State and Federal legislative bodies reflect basic problems arising in various areas of the country. These problems in turn reflect fundamental developments in our American society. To give this overall view of the industrial water supply problem, a brief summary of current legislation and investigations in the field is presented as introduction to a discussion of limited areas concerned with pollution's effects on industrial water use and water conservation measures which industry may apply in order to provide for balanced use of surface and underground water resources.

The problems of industrial water supply, present and future, are in large part an outgrowth of the tremendous industrial expansion that the country has experienced during the past half century and that will continue, according to present forecasts, during the years ahead. One might partially assess the growth of the problem and the outlook for the future by reviewing the Federal Reserve Board Index of Industrial Production for the years 1900–1950 and production estimates for the next 25 years. The index shows a 700-percent increase in production from 1900 to 1950. Forecasts indicate production will again double by 1975. But that does not tell the whole story regarding the problem of water demand. The total industrial production index is only one part of the picture. Proceeding one step further, we find that the industries using the greatest quantities of water—such as chemical, synthetic, and plastics—account for a major proportion of the industrial growth that is taking place.

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This article is based on a paper presented by Mr. Dworsky at the Second Conservation Conference for Representatives of Business, Industry and Finance, held at Hidden Valley, Gaylord, Mich., May 19–21, 1953. Like its predecessor at Higgins Lake, Mich., in November 1952, the May conference was sponsored jointly by the University of Michigan, the Soil Conservation Society of America, the Michigan Department of Conservation, and the National Association of Manufacturers. The business, banking, and industrial representatives attending the May meeting formed a permanent organization—the Conservation Council of Business, Industry and Finance—with the objective of stimulating conservation efforts related to those particular fields of interest and providing coordination and leadership to such activities.

Legislation

In an effort to meet the situation thus created, more than three-quarters of the State legislatures considered various types of water resources legislation during their 1953 sessions.

The fact that a significant portion of the proposed legislation related to broad aspects of the overall water problem is a clear indication that the States are increasingly aware of the importance of water in their future. In addition to authorizing investigation or action with respect to immediate and specific water problems, the proposals included recommendations having long-range significance. In Alabama, Arizona, California, Idaho, and New Mexico, for example, bills relating to the protection of ground-water supplies were proposed, probably as a result of specific conditions in those areas caused by extreme drought, salt-water intrusion, and so forth. In Arizona, California, Colorado, Pennsylvania, South Carolina, South Dakota, and Virginia, the establishment of State boards, commissions, or committees was proposed to make comprehensive studies of the State water resources.

Proposals presented in 19 States related to protection of surface waters through the abatement of pollution. Prior to the 1953 legislative sessions, 11 States had adopted new legislation or amendments to existing laws, patterned after the suggested State water pollution control act developed by the Public Health Service and endorsed by the Council of State Governments (*1*).

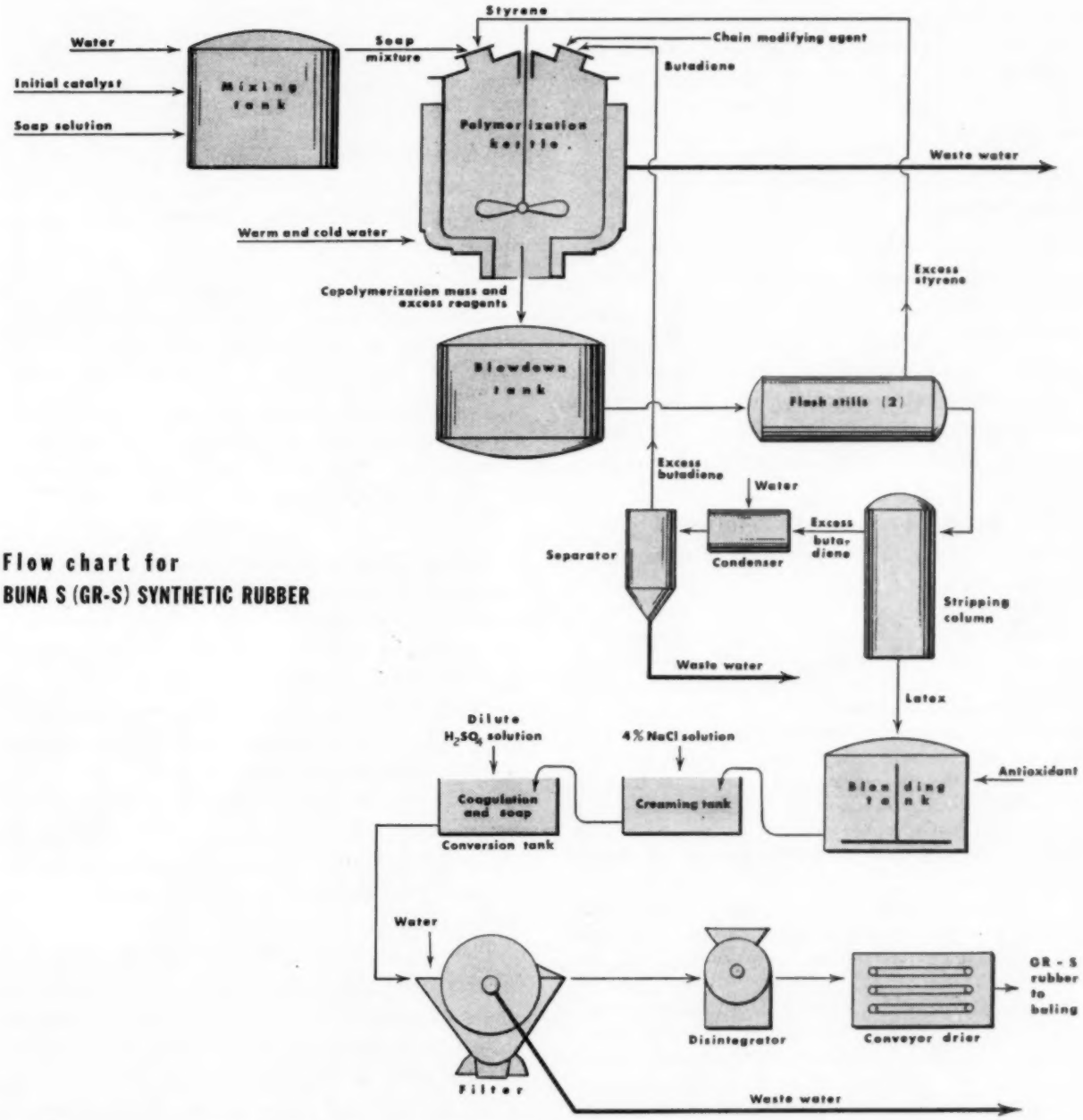
Further support to the growing demand for more adequate legislation regarding water resources and their use is given in the Symposium on Water Law in the South conducted by the Southeastern Regional Law Teachers' Conference in September 1952. In his preface to the special issue of the *South Carolina Law Journal* (*2*) which reproduced the symposium, the editor, Carl W. Littlejohn, Jr., stated: "The subject of water law is now being given marked consideration throughout the southeastern and southern States."

Excerpts from the remarks of the symposium's moderator, Dean Samuel Prince of the South Carolina University Law School, are presented below, in capsule form, as an excellent summary of present trends in water resource use and control.

> This symposium deals primarily with law of water rights in the Southeastern area . . . water law far from uniform in America . . . two separate and distinct systems of water rights, management, and control . . . one based on riparian doctrine . . . the other on prior appropriation doctrine . . . two doctrines are inconsistent with each other and have separate origins. . . .
>
> . . . prior appropriation system concerned with the artificial use of water by owners, whether riparian or not . . . riparian doctrine concerned with natural use of water—use, by owner of land on a stream, for domestic and household purposes . . . other uses whether by the riparian owner or by someone else, classified as artificial use. In the West adjustments have had to be made between these two systems, and in the adjustment vested rights have had to be fully protected. . . . In the Eastern States conflicts now beginning to appear between users for natural purposes and users for artificial purposes, in both fields—ground water and surface water . . . experience in the Western States in adjusting conflicting theories may aid in solving problems in the Eastern States. . . .
>
> Water still plentiful in Southeastern area; but marked increase in needs for industry, agriculture, and municipalities producing conflicts . . . water supplies remaining constant while needs vastly increasing . . . section will continue to develop, and needs will be multiplied . . . the differential between supply and beneficial use needs will constantly lessen, and stresses between rights of users become greater. . . .
>
> If present and future inhabitants are to obtain greatest beneficial use of water resources broad principles will have to be determined by legislative authority . . . there must be some administrative agency to survey and determine what resources now are, how they may be protected, and what they will be in the future . . . to determine who are riparian owners, what are their riparian rights and prescriptive rights, and to what lands these rights are appurtenant . . . to allocate water not only to riparian owners but to others, for artificial uses in agriculture and industry, for municipalities, for fishing, and even for recreation . . . to apply the "balance of convenience" doctrine . . . to modify any allocation that it may have previously made, and to regulate practices and instrumentalities in such uses . . . in making allocations there should be such a degree of permanence as to give assurance to investors that they are justified in making large outlays of money dependent upon such allocation . . . machinery should be set up with a view of preventing waste and making certain that the people obtain the greatest beneficial use from this vital resource . . . early action necessary . . . as number of vested property rights increases, flexibility of regulations for allocation and management of water decreases. . . .
>
> There can be no question but that the State has power of regulation in these matters with due regard for the powers of the Federal Government in the field and subject to the constitutional protection of vested rights.

The conviction of the symposium's participants, in summary, appeared to be that the

The use of water in an industrial process



Flow chart for
BUNA S (GR-S) SYNTHETIC RUBBER

SOURCE: "Chemical Process Industries" by R. Norris Shreve, published by McGraw-Hill, 1945.

Raw materials for manufacture of 100,000 tons per year of Buna S rubber

	Tons
Butadiene	80,000
Styrene	25,000
Soap (Sod. stearate)	4,500
Rock salt	20,000
Water	262,051,750
Coal	401,500

	Tons	
Chlorine	46	Water treatment.
Alum	345	
Soda ash	127	
Sod. metaphosphate	13	

Also unstated quantities of H_2SO_4, NaOH, initiator catalyst, chain modifier, reaction arrestor, antioxidant.

rules evolved from case or decision law are inadequate to deal with the problems of water use and water resources, and that legislation is required in this field to determine broad principles as a means of establishing public policies for the best overall use of the water resources of the country.

Investigations

The current legislative proposals for comprehensive studies of water resources foretell a further advance in the movement already under way in many of the States. Reports of studies recently completed and in progress have invariably given recognition to the importance of adequate industrial water supplies for the full development of the regions under consideration.

The Natural Resources Committee of the Oklahoma Society of Professional Engineers reported (*3*):

"Need of industry for water supplies is even more pressing than the need of our cities and towns. Advances in technology have added greatly to our industrial water requirements, both in quantity and quality of water needed. Rayon and nylon processing, for example, require much larger volumes of water than to process the cotton and wool which they are replacing. Each advance in oil refining requires more water. Synthetic rubber production uses much more water than was used in the production of natural rubber. . . .

". . . it seems apparent that water for consumptive use is, and without remedial action will continue to be, a limiting factor in Oklahoma's growth and economic well-being. . . .

"The Committee recommends to the Governor of Oklahoma that . . . suitable legislation should be passed to enable some legal entity of the State of Oklahoma to cooperate with Federal agencies, local communities, corporations, and individuals in the planning and financing of projects for the development and use of water resources. . . ."

The Rhode Island Water Resources Commission in an extensive report of a study made at the direction of the 1951 legislature, stated (*4*):

"Because of the very limited area constituting the State of Rhode Island, and the importance of maintaining the present industrial development and possible expansion of this development, the engineers feel that a policy must be adopted by the State aimed towards protection of the present water resources, both surface and ground, and for the development of the same as recreational and industrial demands may require . . . it should be the policy of the State to encourage further investigation as to ground water conditions with financial aid by the State."

The Committee on Water Resources of the Advisory Council on the Virginia Economy in a report on the water resources of Virginia states (*5*):

"The future growth and prosperity and perhaps even the continued existence of some communities and industries are in large measure dependent upon the availability and development of an adequate supply of water of satisfactory quality . . . it is important that the responsible officials of communities . . . fully investigate the anticipated needs of any such industries, in order to safeguard and prevent any possible contamination or dangerous depletion of water supplies."

In November 1951, the Louisiana State University and Agricultural and Mechanical College sponsored a symposium (*6*) which resulted in gathering together the pertinent facts regarding the utilization of the State's water resources, including various factors of industrial use. The Texas Society of Civil Engineers made a study for the State of Texas (*7*). California agencies have conducted a series of investigations. Everywhere there is evidence of the States' concern that their valuable water resources be protected and developed to their fullest and best utilization.

The State studies have supplemented the several national and regional investigations made by various agencies and special commissions of the Federal Government. The work of the President's Water Resources Policy Commission extended over a period of about a year, and while there has been considerable debate with regard to some aspects of the Commission's report (*8*), when read as a whole there is no question but that it presents an important overall view of the national water problem and its impact on our physical, social, and economic welfare.

The report of the President's Materials Policy (Paley) Commission (*9*), also based on the results of about a year's study, while accepting

several of the primary theses of the Water Resources Policy Commission, points specifically to the problem of industrial water supply. In introducing the chapter relating to that subject, the Commission stated:

"The Nation already has a serious industrial water problem and belatedly is coming to recognize it as such. During the Second World War, plans for building at least 300 industrial or military establishments had to be abandoned or modified because of inadequate water supply. Many areas of the country are feeling the pinch either because ground water reserves are being exhausted, or because surface and ground waters are polluted. There can be no question that more will feel the pinch in the next 25 years, and that it will grow sharper. By 1975, access to good water may become the most important factor in deciding where to locate industries."

Reports of the Public Lands Committee of the House of Representatives, particularly a section relating to the collection of basic data on water resources (*10*), and of the Interior and Insular Affairs Committee, particularly the volumes relating to water supply and uses and ground water problems (*11*), are indicative of the growing intensity of interest in the water problem.

Problems of both domestic and industrial water supply are being given consideration in the comprehensive water and related land use surveys directed by the Congress that are under way in the Arkansas-White-Red River Basins and the New York-New England area. These studies are being made by interagency committees composed of representatives of the Federal agencies concerned in these problems, and of the States in the areas affected. Public Health Service representatives on the interagency committees have major responsibility for the water supply and water pollution control aspects of the investigations.

In the reports on the surveys of pollution conditions in the waters of the United States, undertaken jointly by the Public Health Service and the States soon after passage of the Federal Water Pollution Control Act, there is recurring emphasis of industry's need for adequate supplies of water (*12*). The following two comments are typical:

Tennessee: "Industrial water needs in the basin exceed those for domestic purposes . . . considerable quantities are required for manufacturing processes, many of which require an extremely high water quality."

North Atlantic: "Development of the highly industrialized sections of the North Atlantic Drainage Basins has been in part due to the availability of adequate volumes of water for industrial purposes. The industrial demands on water supply have in recent years become so great that future expansion may be limited unless adequate supplies can be provided and existing supplies protected from damaging pollution."

Reports of the Department of the Interior on its study of the southwestern drought areas in 1951 (*13*) and of the Missouri River Basin Commission on its study of basin development problems, made at the direction of the President (*14*), include industrial water supply as an important factor in the economy of the regions under consideration.

The Executive Office of the President took an important action in 1952 affecting the operation of water resources development programs supported by Federal funds. Standards and procedures to be used in reviewing projects in consideration of budget requirements are set forth in Bureau of the Budget Circular A–47. Provision is made for the incorporation of water supply for domestic, municipal, or industrial purposes in Federal projects, if the total financial costs for this purpose are fully reimbursed to the Federal Government by the persons served. Provision is also made for inclusion of anticipated future requirements, if the cost of the additional facilities for such use is not more than 15 percent of the total construction costs of the project, and if local industrial or municipal users give reasonable assurance that use of the reserved water supply will begin within 10 years. All financial costs are to be paid within 50 years after date of initial use.

Water Quality

Industry's water problem is not concerned merely with adequate quantity. In many cases, quality is of equal importance. Although water quality standards are comparatively low for some industrial purposes, most uses have certain quality requirements and some are equal to or even higher than that demanded for drinking purposes.

Water used for cooling condensers must not be unduly corrosive and must not cause excessive deposition of scale. If large amounts of organic materials occur in cooling waters the efficiency of cooling is apt to be impaired, the growth of bacteria and fungus may cause unpleasant odors, and the cost of treating such water may be high. The requirements for boiler feed are more exacting. For boilers operating at low pressures water is frequently used without preliminary treatment; for higher pressures, where the composition of the water is more important, treatment such as softening, demineralization, and deaeration are often necessary.

The composition of water used for papermaking is important. For high-grade papers some of the usual quality requirements are softness, low iron and manganese content, freedom from suspended matter, low quantity of carbon dioxide, and relative freedom from organic matter and bacteria. Soft water is preferred to hard water by many industries such as soap manufacturing, wool degreasing, some types of dyeing, textile bleaching, tanning, and laundering. For a large number of industries, for example, bleaching, tanning, and dyeing, it is important that the water used should be very low in iron content (*15*).

For industries having high requirements, the widespread pollution of surface waters is daily becoming more serious. Since treatment adds to processing costs and ultimately to the price of the product, industries attempt to locate new plants where the water supply is of satisfactory quality to meet their needs with a minimum of treatment for purification. Some river valleys are now almost completely closed to further industrial growth either because present pollution makes the water supply unsatisfactory for new industries or because the pollution which new industries would create would destroy the present necessary uses of the water. This not only damages the valley itself; it is also a threat to total national production.

Pollution Damage

Data are not available to show the total effect of pollution on industrial water use. We do have some indication, however, that it is of considerable magnitude. Under the provisions of the Water Pollution Control Act, the Public Health Service and the State water pollution control agencies have made preliminary surveys to identify instances of interstate pollution; that is, cases in which pollution entering a stream in one State travels downstream and affects the health and welfare of people in an adjoining State. In about 30 percent of the 110 such cases that have been revealed by the surveys, damage to industrial water supplies is reported. Since instances of interstate pollution normally occur close to the boundary lines of States, the waters involved in these cases represent but a small proportion of the total surface waters of the United States. In the light of the fact that more than 90 percent of industry's fresh water supply is obtained from surface sources (*16*), it would appear that for the country as a whole pollution damage to industrial water uses is great.

While the information on these interstate situations indicates that pollution is causing substantial damage to industrial water supplies, it is interesting to note that the disposal of industrial water after it has been used is listed in all cases as a cause of pollution. In some instances sewage is also included as a pollutant. In the northeast, the used waters and the wastes they carry from textile and paper mills and tanneries are most frequently mentioned; in the southeast, textile and paper mills are the principal sources; in the upper midwest, paper and food processing; in the Ohio, chemical, metal finishing, steel and paper mills, and acid mine drainage; in the southwest, petroleum wastes, brine, food processing, and paper; in the Pacific northwest, paper, chemicals, and food processing.

The effects of these wastes are varied—not all of them are yet known. Paper-mill wastes, a problem in almost every area, are composed of inorganic acids, salts, and both soluble and insoluble substances, which affect biochemical oxygen demand (B. O. D.) and color. The effects of textile wastes vary according to type and process used—rayon (viscose) affects B. O. D. and pH, causes tastes and odors, and is frequently toxic; wool-scouring wastes affect B. O. D., pH, and color, contribute to taste and odor problems, and cause turbidity. Water

that has been used for cooling (steel and allied processes) raises the temperature of the stream to which it is returned, often causing difficulties. The Mahoning River in Ohio, one of the most used rivers in the country, provides an example of deleterious temperature effects. During one winter month a few years ago, the water diverted from the river, mostly for industrial cooling purposes, was 10 times the average flow of the river. Much of this water was returned after being used. The temperature of the river approached 140° F. during that month. It was so high that normal sewage-purification processes were ineffective and pollution became a serious problem (*17*).

A particularly striking example of the effect of industrial wastes on water supplies, both domestic and industrial, is related in the report of a specific study of brine contamination in the Muskingum River made by the Ohio River Valley Water Sanitation Commission in cooperation with several State, Federal and industrial agencies (*18*). The development and utilization of the vast salt deposits in Ohio resulted in large amounts of chloride wastes being discharged into the Muskingum River, with attendant effects on industrial waters taken directly from the river and on the ground waters used by industry adjacent to the river. In addition, physiological effects were felt by people in the area. This health factor is one which would certainly be taken into consideration along with the quality of industrial water supply by any industry contemplating the location of a new plant in the affected area.

Conservation Methods and Balanced Use

On the long-term average, year after year, the total amount of water is kept fairly constant, through Nature's replenishment. As the country develops, we are increasing the amount of the usable supply—that part on hand or stored either in surface reservoirs or in accessible underground aquifers—in order that there will be an adequate volume available to provide for the needs of the growing population and expanding industry. Although it is unlikely that at any time in the foreseeable future the Nation's total supply will be less than the total demand, the supply is not always available at the time and in the place that it is needed. Increased water use has already resulted in critical shortages in some areas formerly believed to have adequate resources for future development.

Among the many factors that have contributed to these unanticipated shortages are: failure to balance withdrawals from ground water sources in line with natural replenishment; failure to provide manmade structures for holding seasonal surpluses for later distribution; failure to make maximum use of supplies from surface sources because of pollution by discharge of untreated wastes; expanded requirements due to rapid growth and concentration of population and industries; increased use of air conditioning and water-using household devices; lack of adequate basic data on the availability of water resources; water wastage; failure to use available salt water, when suitable, rather than fresh water; inadequate evaluation of water supply prior to selection of plant sites; inadequate planning of water-consuming plant equipment.

Ways of combating some of these factors are already available and can be readily applied by industry in connection with its own use of water. On the matter of wastage, for example, corrective measures are usually fairly obvious. They vary with individual situations, but can be readily worked out through study of plant operations. Many industries have already achieved substantial savings through better housekeeping methods, recirculation, multiple-use, revised processes, and so on (*19–21*).

Water Pollution Control

With respect to abatement of water pollution, some progress is being made through the provision of waste-treatment facilities. During 1952, 515 communities in the United States awarded contracts for the construction of public sewage-treatment plants involving the expenditure of $137 million. Of this amount, about $78.5 million was for new plants and the remaining $58.5 million for additions, enlargements, or replacements to existing plants. This marks a step in the right direction, but the rate of construction is still far less than that required to bring under control the pollution caused by municipal wastes. It has been estimated, on the basis of a survey of sewage-treat-

ment plant needs in 1950, that the construction rate should be from $450 million to $500 million a year over a 10-year period in order to meet present needs and care for new requirements as they arise (*22*).

Similar construction data are not available to permit measurement of progress in abating pollution caused by industrial wastes. The 1950 surveys indicated that at that time about 2,800 new industrial waste-treatment plants, 100 replacements, and 600 additions or enlargements were needed, with treatment requirements of an additional 5,500 plants undetermined (*23*). The compilation of interstate situations referred to earlier and specific studies made during recent years by the New England Interstate Water Pollution Control Commission (*24*) and the Interstate Sanitation Commission (*25*) indicate the continued prevalence of industrial waste problems.

Future prospects for accelerated action appear promising, in the light of the public statements of such leaders of industry as the Dupont and Union Carbide companies to the effect that it is their policy not to permit construction of new manufacturing units until methods have been developed for properly handling the wastes of such plants (*26*). Further evidences of industry's real interest in finding solutions to industrial waste problems are apparent in the work of the National Technical Task Committee on Industrial Wastes, composed of representatives of the 36 major industrial categories. That committee is fostering the exchange of technical information on the various phases of the problem through work of task groups on specific projects and through a compilation of a punchcard inventory of present knowledge and research studies in progress. This inventory, which will consist of approximately 10,000 items, is being prepared with the assistance of committee members under the direction of the chief of the technical services branch of the Public Health Service's Division of Water Pollution Control, who acts as secretary to the National Technical Task Committee.

Basic Data Collection

In the considerable volume of recent literature on the water resources problem, there is agreement that the collection of more adequate basic data is a primary need for the operation of effective water utilization programs. Abel Wolman says ". . . the lessons to be learned are primarily those pointing to the necessity of . . . providing more flexible and prompt inventory of water resources" (*27*). A report of the House Committee on Public Lands (*28*) states:

> "A complete balance sheet should be developed and maintained that will show the total water resources, the maximum quantities of water that can be made available for all useful purposes, and the extent of the wasteful uses. The size and scope of the Federal basic-data program in water resources should be brought into harmony . . . with the magnitude and complexity of the resource itself and should provide an adequate and dependable basic-data foundation for projects to develop the maximum uses of water."

Harold E. Thomas, in the report of his studies made for the Conservation Foundation (*17*), stated:

> "Utilization of ground-water reservoirs for the greatest benefit of civilization is dependent first on adequate hydrologic data, from which the full potential of development is determined. . . We do not know enough about most ground-water reservoirs to give a quantitative answer as to their potentialities or limitations for development."

Similar acknowledgment of the basic need of increasing fundamental knowledge concerning water resources to permit their maximum utilization is made by the President's Water Resources Policy Commission (*8*), the President's Materials Policy Commission (*9*), and the Engineers Joint Council (*29*).

Data of importance to health agencies, in order that they may be prepared to participate in water resources planning activities, include information on the adequacy of domestic and municipal water supply facilities and on water needs for future population growth. It is essential, too, that health agencies interest themselves in industrial needs. Estimates indicate that from 25 to 50 percent of municipal water supplies are sold for industrial purposes. Thus in important respects the problems of providing adequate and safe public drinking water supplies are closely intertwined with those of providing a significant share of industry's water requirements.

Ground Water Replenishment

As surface water pollution has become more widespread, industries and municipalities have turned to ground-water sources of supply. In some areas the amounts withdrawn have exceeded the natural recharge, with a resultant lowering of the ground-water table. For some ground-water reservoirs, it is possible to reduce the difference between withdrawals and natural replenishment by artificial recharge. Surplus stream water may in some cases be diverted into the ground-water reservoir through construction of storage dams and percolating works. This method has been followed in several California areas.

The reclamation of water from sewage and industrial wastes and its utilization to recharge underground supplies, as well as for other more direct purposes, have been the subject of intensive investigation in California and elsewhere. A M Rawn, chief engineer and general manager of the Los Angeles County Sanitation District, reports (*30*):

"The scientific and engineering principles necessary to reclaim from sewage a water suitable for any useful purposes are already well founded."

He points out that there are significant differences between the processes of sewage disposal and water reclamation and contends that treatment of the two functions as completely separate operations would remove many of the objections now advanced, from health and esthetic standpoints, to the use of reclaimed water.

Studies made by the University of California (*31*, *32*) have indicated that through processes similar to those used for sewage disposal and water purification, it is possible to reclaim from sewage and industrial wastes water that is satisfactory for domestic, industrial, agricultural, and other purposes. The studies have demonstrated that at present the cost of reclamation is generally less than that of providing supplemental water by such means as transportation through aqueducts from watersheds having surplus supplies, sea water conversion, or controlled rainmaking. As a matter of interest in this connection, it might be noted that there has recently been considerable activity and significant progress in research relating to both weather modification and sea water conversion. Under Federal legislation enacted during the past two sessions of the Congress (*33*, *34*), the scientific advances in these fields are being evaluated and impetus is being given to further research designed to provide methods for practical application.

While there are a number of instances of industrial re-use of waste waters, according to Wolman this practice is not nearly so widespread as it might be (*27*). The two outstanding examples he cites are the Bethlehem Steel Company plant at Sparrows Point (near Baltimore) and the Fontana (California) plant of the Kaiser Steel Corporation.

The Bethlehem plant uses 40 million gallons per day of Baltimore City sewage effluent. Without it, the company would be unable to carry on its expanded operations at that location, as the water supplies of the area would be unequal to this additional drain (*35*). At Fontana, approximately 50,000 gallons of water are recirculated for every ton of steel shipped out. This recirculation requires approximately 2.5-percent makeup, or 1,400 gallons of actual consumption per ton of steel produced, in contrast to the national average of 65,000 gallons per ton of steel produced in other mills (*36*).

Conclusion

From the foregoing review of the Nation's water problem as it affects industry, several factors stand out as most important:

1. From the investigations of legislative bodies, and as a result of authorizations and recognition of the problem in law, it is apparent that considerable planning, research, and data collection are being undertaken with respect to the matter of water resources and their effect on industrial development.

2. It is evident that under many State laws, especially those of more recent origin which provide protection for all water uses, and also in the Federal legislation on the subject, damage to industrial water supplies provides an adequate basis for legal action to remedy the cause of the damage. For instances of specific

damage to a particular plant, industry of course has had remedies in law under the riparian rights or reasonable use or prior appropriation doctrines. However, under the broadened approach reflected in State legislation today, official agencies can now utilize damages to industrial water supplies, fish and wildlife, recreation, and agriculture, as well as to public health, as a basis for initiating action against polluters, whether municipal, industrial, or others.

3. Industry plays a dual role in this situation. While, on the one hand, industry represents an important economic area that is being damaged by water pollution, on the other hand, it shares with municipalities the role of a major originator of pollution. The forward-looking approach adopted by some of the Nation's leading industries, and the progress being achieved between government (Federal, State, or interstate) and industry through committees such as the National Technical Task Committee on Industrial Wastes, are indications of what can be accomplished. But there is still a great deal of work ahead before all the problems incident to the disposal of industrial waste waters are satisfactorily solved.

4. The increasingly frequent occurrences of water shortage due to ground-water depletion point to the necessity for more extensive use of surface waters as replacements for, or in conjunction with, underground supply. Because of the polluted condition of many of the surface sources, the tendency in recent years has been to avoid their use in favor of the better quality ground water. The country can no longer afford that luxury, but must make maximum use of all its resources. As water requirements increase in volume, use of the conservation practices that are available—reclamation, recirculation, pollution abatement—must be expanded.

The Engineers Joint Council, in the corrective program suggested in its "Principles of a Sound National Water Policy" (*29*), aptly summarized the goal toward which we are all working, and the manner in which it may best be achieved:

"The water demanded for our expanding industries can and must be provided. The solution of the problem, involving as it does complex economic aspects, may only be found by an enlightened viewpoint reflected by industrial management and equitable, reasonable regulations. Such regulations must be imposed by mutual agreement and cooperative effort among those affected and by constructive long-term planning by municipal and State regulations."

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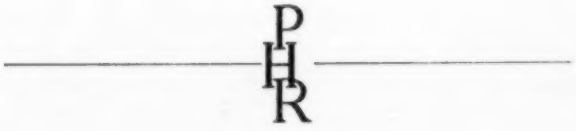

Georgia's Approach To Elements of Planning For Administrative Action

By Guy V. Rice, M.D.

OVER THE past 2 years, members of the staff of the Health Conservation Services in the Georgia Department of Public Health have worked together in 1- and 2-day conferences on the general subject of program planning. One of the worthwhile results of these conferences is an outline of the elements of program and administrative planning. There has come about also an understanding of the importance and the usefulness of developing logical plans on the part of several divisions in the Health Conservation Services, namely, the divisions of maternal and child health, mental hygiene, crippled children, school health, and the nutrition section.

Broadly, the staff conferees agreed that the planning process may be divided into six major categories: recognition of problem, estimate of the situation, decision, operative plan, evaluation, and communications.

To help us recognize the real problem and carry out subsequent action in planning, we need to make an estimate of the situation by outlining the essential elements of information, possible action, factors that affect possible action, and the most desirable action (outline, 2).

Elements of information (outline, 2a), have been classed as trends, public interest and understanding, pressure, political situation, resources, statistics, reports, and the overall policies and objectives. We are all caught in these situations. Either we use them to advantage or struggle against overwhelming difficulties. Regardless of local interest and understanding, progress will always be slow until nationwide public interest and understanding develop and the trends of movement can be seen. Pressure and political situation may act favorably or unfavorably. The resources to do the whole job may be lacking. If overall policies have not been established and objectives clearly defined, we cannot proceed with action to accomplish even intermediate objectives.

Dr. Rice is director of the Health Conservation Services of the Georgia Department of Public Health. His paper, of which this is a somewhat shortened version, was read before the health officers' section of the Southern Branch, American Public Health Association, on April 23, 1953.

Accomplishing the Task

One reason why public health is in difficulties at the present time is that we have failed in properly defining our long-range objectives. We talk about chronic illness, aging, and mental hygiene but present no clearly defined objectives in these areas. By not properly outlining our objectives we are failing in our purpose.

In addition to essential elements of information, the estimate of the situation weighs possible action according to the factors affecting it. The purpose of administrative organization is to produce and sustain efficient action. By efficient action, we mean that which will accomplish our objectives with a minimum expenditure of resources: money, personnel, time.

In considering possible action (outline, 2b), it is well to list all possible action that would lead to accomplishment of our task. For example, in the control of malaria: Do we drain? Do we fill? Do we spray? Do we treat the carriers? Do we use prophylactic treatment? Do we screen houses or use mosquito nets? Do we move the people out of the area? Do we educate the general population? Do we use one or a combination of these factors?

In considering favorable or unfavorable factors affecting possible action (outline, 2c), does it cost little or much money? Does it require

Elements of Planning—An Outline For Public Health Administration

1. Recognition of problem (need).
2. Estimate of the situation.
   a. Essential elements of information:
      Trends.
      Public interest and understanding.
      Pressure (public and special interest).
      Political situation.
      Resources, statistics, reports, etc.
      Overall policies and objectives.
   b. Possible action.
   c. Factors affecting possible action:
      Favorable.
      Unfavorable.
      Capabilities.
      Resources.
   d. Most desirable action (use of criteria for determining priorities).
3. Decision: Who, what, when, how.
4. Operative plan.
   a. Implementation:
      Definition of objectives.
      Selection of staff.
      Definition of roles.
      Dissemination of information.
      Directives.
      Instructions.
      Supervision.
   b. Alternate plans.
   c. Pilot study.
5. Evaluation:
   a. Observation.
   b. Reports.
   c. Measure against criteria.
   d. Research and reviews.
   e. Continuous redefinition of objectives.
6. Communications:
   a. Conferences.
   b. Memorandums and letters.
   c. Questionnaires.
   d. Books and other printed material.

much or little time? Does it have public acceptance? Is it a permanent or temporary measure?

Do we have the resources in personnel, time, and equipment, and does our staff have the capabilities? Do we have the understanding? Do we have the knowledge to carry out these procedures? After looking at all possible action and factors affecting it, we can usually see which is the most desirable action to take and that this is only a small part of our decision (outline, 3).

The decision must not only state what action will be taken but by whom and when, how, and why it will be taken. When the most desirable action has been determined, an immediate decision should be made, clearly stating what action is to be taken, who will do it, when and how it is to be done, and why it should be done. Indecision, or lack of decision after the best possible course of action has been determined, is worse than a poor decision.

The Operative Plan

The operative plan (outline, 4), is concerned with three phases of development.

In the implementation of the plan (outline, 4a), it should be remembered that "no plan" gives too much freedom of action, that "too much plan" produces "no action," and that both fail to accomplish the objectives. We need, therefore, to keep in the middle of the road in the development of the operative plan. Objectives must be clearly defined and understood by all. There should be selected staff qualified to do the job required and roles clearly defined. Even minor functions need to be defined, or personnel performing them will prevent the carrying out of more important duties. It is especially important to define the roles of the various staff members in a multidiscipline organization by dividing staff and line functions.

It is important to select the number of employees necessary to accomplish the objectives which we have defined and see that they have the training and qualifications necessary to do the job. If the persons selected are not adequately prepared, they must be given training and experience.

In addition to the assignment of duties, it is necessary to disseminate information and issue clear-cut directives and instructions. Some directors may hesitate to give clear-cut directives

so as not to appear undemocratic, but their hesitation makes it impossible for the employee to make definite decisions and to take the necessary action in his field of activity. We in public health have been long on delegating authority but short in giving proper supervision.

Alternate plans (outline, 4b) are necessary in the event a rapid change is required in our plan of program development. If pilot studies (outline, 4c) are used to iron out the difficulties before proceeding with a full-scale program, we can avoid the possibility of creating antagonism which might delay the development of the program for years.

In order to continue a successful operation, it is necessary to carry out a continuous process of evaluation (outline, 5) step by step from firsthand observation to a continuous redefinition of objectives. For example, in the field of mental hygiene, we need to develop criteria to determine priorities in this area and to do research in mental health practice so that we may proceed in a logical way.

Communications (outline, 6) are especially important in a democratic organization in order that each person may know the objectives, the decisions upon which operations are based, policies, overall understanding, and be able to move together.

All of the four outlined methods for keeping informed about the administration of a program should be developed completely to produce the greatest understanding in order that our action will be the logical development of the organization as a whole and will utilize to the fullest the capabilities of every worker.

PHS Staff Announcements

ENNES

Howard Ennes, executive editor of Public Health Reports since 1952, has been selected to head a new program of public health and preventive medicine, and health education for the Equitable Life Assurance Society of the United States. As of January 1, 1954, he will be associated with **Dr. Norvin C. Kiefer,** since August of 1953 chief medical director of the insurance organization and a former Public Health Service officer.

During the war period, Dr. Kiefer served with the Division of Tuberculosis. In 1948 he was assigned to the Office of the Surgeon General as the first chief of health emergency planning. He served also with the National Security Resources Board in the Executive Office of the President and in 1949–51 was director of the Board's Health Resources Office. Until his recent appointment, he was director of the Health and Special Weapons Defense Office of the Federal Civil Defense Administration.

Mr. Ennes came to the Public Health Service in 1938 on a cooperative project in venereal disease control with the American Social Hygiene Association. His assignment with the Division of Venereal Disease was interrupted by war service in the Division of Preventive Medicine of the Navy's Bureau of Medicine and Surgery. In 1947–48, he directed a venereal disease research project for the Public Health Service at New Haven in cooperation with Yale University, and in 1948–49 was director of health education in the Erie County (Buffalo, N. Y.) Department of Health. Since 1950, he has served with the Surgeon General's Committee on Publications, latterly as executive secretary.

Accounting for Federal Health Funds *in the* Oklahoma State Health Department

By FLOYD HARRINGTON

OKLAHOMA'S public health program, State and local, is primarily organized to provide general public health services—the staffs and other resources of the health departments serve the purposes of two or more special health programs. This type of generalized staffing is necessary in Oklahoma in order to make the most efficient use of available funds. When health services are provided on such a basis, however, accounting for, and reporting on, the use of categorical grant-in-aid funds is complicated. This is one reason why Oklahoma has always supported the official view of the Association of State and Territorial Health Officers that a single Federal grant-in-aid fund would be preferable to some 7 categorical grant-in-aid funds administered by the Public Health Service and 3 funds administered by the Children's Bureau. In lieu of consolidation of the various grant funds, however, accounting procedures can be adjusted to eliminate details which are more likely to confound than to assist program directors.

Impetus for the development of a simplified fund accounting system came from the adoption of a new regulatory requirement which is to be effective for the fiscal year 1954. In the plans for this next fiscal year, State health departments are required to describe the validation procedure they use in accounting for the distribution of categorical grant funds among the various divisions and activities. Since a description of the methods used to allot categorical funds in support of general health programs is to be officially submitted to the Federal agencies and approved by them, it seemed logical to also use such a plan for another purpose. The grant-in-aid regulations already provided for combining Federal grant funds into a single account on the books of the State comptroller and the State treasurer. Aside from the consolidation of accounts kept by these two officials, the only obstacle to simplification of Federal fund accounting was adoption and approval of an official validation plan.

Fiscal codes in Oklahoma do not provide for combining Federal funds with State funds in a single account. Rather than request a legislative change for the purpose of an experiment, a proposal was worked out within existing ad-

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Mr. Harrington has been director of fiscal and personnel services in the Oklahoma State Department of Health since 1941. The single operating account, in which State and Federal funds are commingled for operating purposes, was discussed and a brief résumé of the techniques six States are using in applying this principle, in whole or in part, was given in the November 1953 issue of Public Health Reports, pp. 1071–1077.

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ministrative requirements. The State officials involved and representatives of the Public Health Service and the Children's Bureau agreed to the creation of a single fund account for all Federal funds. The plan was approved for experimental operation in Oklahoma for the fiscal year 1953 and has been adopted for 1954 use.

Budgets

The basic document in the system being tried by Oklahoma is the working budget. A sample working budget form with typical entries is shown in form 1. Federal funds, it will be observed, are lumped in one column. On the basis of plans made by the program or project director (the public health nursing division in this example), the total cost of each project is divided first between State and Federal accounts and then the amount allocated to the Federal account is distributed among the various participating Federal grant funds. Insofar as possible each item of expenditure in a project is charged in its entirety either to the State appropriation account or to the Federal operating account.

This procedure contrasts with the old system in one important respect. No entries appear in the separate Federal fund columns opposite individual budget items. The fund breakdown appears only on the "Totals" line. Under the previous system the working budget would look as shown in form 2. The advantage of the ex-

Form 1. Sample working budget, public health nursing division, budget No. 90, fiscal year 1954

Object	Total	State	Federal account	General health, hospital survey and planning, and water pollution control	Venereal disease control, venereal disease special projects, and mental health	Tuberculosis control, cancer control, and heart disease	Maternal and child health, A	Public health service program	Maternal and child health program
1. Salaries:									
Director	$6,300	$6,300	-------						
Public health nurse consultant (maternal and child health)	5,160	-------	$5,160						
Public health nurse consultant (chronic)	5,160	-------	5,160						
Public health nurse consultant (mental)	4,920	-------	4,920						
Hospital consultant nurse	4,380	4,380	-------						
4 public health nursing supervisors at $4,200	16,800	8,400	8,400						
Stenographer	2,160	2,160	-------						
Subtotal	44,880	21,240	23,640						
2. Travel:									
Director	1,200	1,200	-------						
3 public health nurse consultants at $1,500	4,500	1,500	3,000						
Hospital consultant nurse	1,800	1,800	-------						
4 public health nursing supervisors at $1,200	4,800	2,400	2,400						
Subtotal	12,300	6,900	5,400						
3. Other expenditures	1,000	1,000	-------						
Total	58,180	29,140	29,040	G $10,800	M $6,420	T $1,720 C 1,720 HD 1,720	$6,660	M $7,070 T 2,320 C 2,910 HD 2,910 V 2,320	$11,620

Form 2. Sample working budget of the former accounting system, public health nursing division, budget No. 90, fiscal year 1954

Object	Total	State	General health, hospital survey and planning, and water pollution control	Venereal disease control, venereal disease special projects, and mental health	Tuberculosis control, cancer control, and heart disease	Maternal and child health, A	Public health service program	Maternal and child health program
1. Salaries:								
Director	$6,300	$6,300						
Public health nurse consultant (maternal and child health)	5,160					$5,160		
Public health nurse consultant (chronic)	5,160				T $1,720 C 1,720 HD 1,720			
Public health nurse consultant (mental)	4,920			M $4,920				
Hospital consultant nurse	4,380	4,380						
4 public health nurse supervisors at $4,200	16,800	8,400	G $8,400					
Stenographer	2,160	2,160						
Subtotal	44,880	21,240	G 8,400	M 4,920	T 1,720 C 1,720 HD 1,720	5,160		
2. Travel:								
Director	1,200	1,200						
3 public health nurse consultants at $1,500	4,500	1,500		M 1,500		1,500		
Hospital consultant nurse	1,800	1,800						
4 public health nurse supervisors at $1,200	4,800	2,400	G 2,400					
Subtotal	12,300	6,900	G 2,400	M 1,500		1,500		
3. Other expenditures	1,000	1,000						
Total	58,180	29,140	G 10,800	M 6,420	T 1,720 C 1,720 HD 1,720	6,660	M $7,070 T 2,320 C 2,910 HD 2,910 V 2,320	$11,620

perimental system lies in the elimination of numerous arbitrary decisions about the propriety of specific fund support for individual salary and other expense items. Support for a program from the project as a whole is the important consideration. This change in budgeting procedure focuses attention upon that major determination.

Program and project directors determine program support, project by project, from estimates of staff time and analyses of operating statistics. These budget estimates are being validated through the time studies of local health departments and of the central office divisions serving two or more categorical programs.

Budgets submitted to the Children's Bureau and the Public Health Service are not affected by the procedure used in preparing working budgets. The CB–PHS budget for health services (joint form 3) is prepared as usual from the total amounts distributed to State and local resources and to each of the Federal grant accounts for each project.

Transfer of the amounts budgeted for the public health nursing division from the working budget to the budget for health services is illustrated in sections A and B of the chart.

Books of Accounts

The separate special fund accounts kept by the State comptroller and State treasurer are reduced from 10 to 2.

OLD ACCOUNTS

Eliminated	*Retained*
Hospital survey and planning	Federal hospital construction.
General health	
Tuberculosis control	
Venereal disease control	
Maternal and child health	
Cancer control	
Mental health	
Heart disease control	
Water pollution survey	

NEW ACCOUNT

Federal funds

Accounts kept by the State health department are organized in three ledgers. In two project ledgers, one for State funds and the other for the combined Federal funds, accounts are kept for salaries, for travel, and for operating expenses, project by project. A budget ledger contains accounts for each Federal categorical fund by project totals only (chart C).

Routine expenditure of Federal funds is made from the single Federal account. Charges are posted to the expenditure object accounts in the combined Federal fund project ledger and in the State revenue account ledger (charts D and E). The work of posting voucher charges to expenditure object accounts has been reduced materially. Approximately one-fourth of the time previously spent in making fund distributions of travel and purchase vouchers is estimated to be presently required. A savings of 6 or 7 man-days per month is achieved by the simplification of this single process.

Each month a reconciliation of accounts is made with the State comptroller. The basis for this reconciliation is the control account kept in the combined Federal fund project ledger. One reconciliation now takes the place of nine previous reconciliations. Contrary to what might be expected from the potentially greater volume of transactions to be examined, there has been a noticeable saving of time in making the monthly reconciliations.

Reports

At the close of each quarter the total of Federal fund expenditures for the quarter from each project is prorated and posted to categorical fund project accounts in the budget ledger on the basis of percentages derived from the amounts budgeted. In the example given for the public health nursing division, $29,140 of State funds and $29,040 of Federal funds were budgeted. Of the Federal funds, $10,800 were general health funds. This amounts to 37.19 percent of $29,040. Mental health funds utilized in the project came to $6,420, or 22.11 percent of $29,040. Therefore, when a first quarter expenditure from the Federal account of $7,110 is distributed among the various participating grant funds, 37.19 percent is posted to the project ledger account in the general health ledger and 22.11 percent of $7,110 is posted to the mental health fund project account (charts C and D).

Quarterly financial reports are prepared from the categorical fund ledgers (chart F). No change in procedures is required for preparing these reports.

Budget Revisions

If Federal funds are lapsed from a project to working reserve, the working budget percentages are used in allocating lapsed funds back to the categorical grant funds. A working reserve account is established in the Federal ac-

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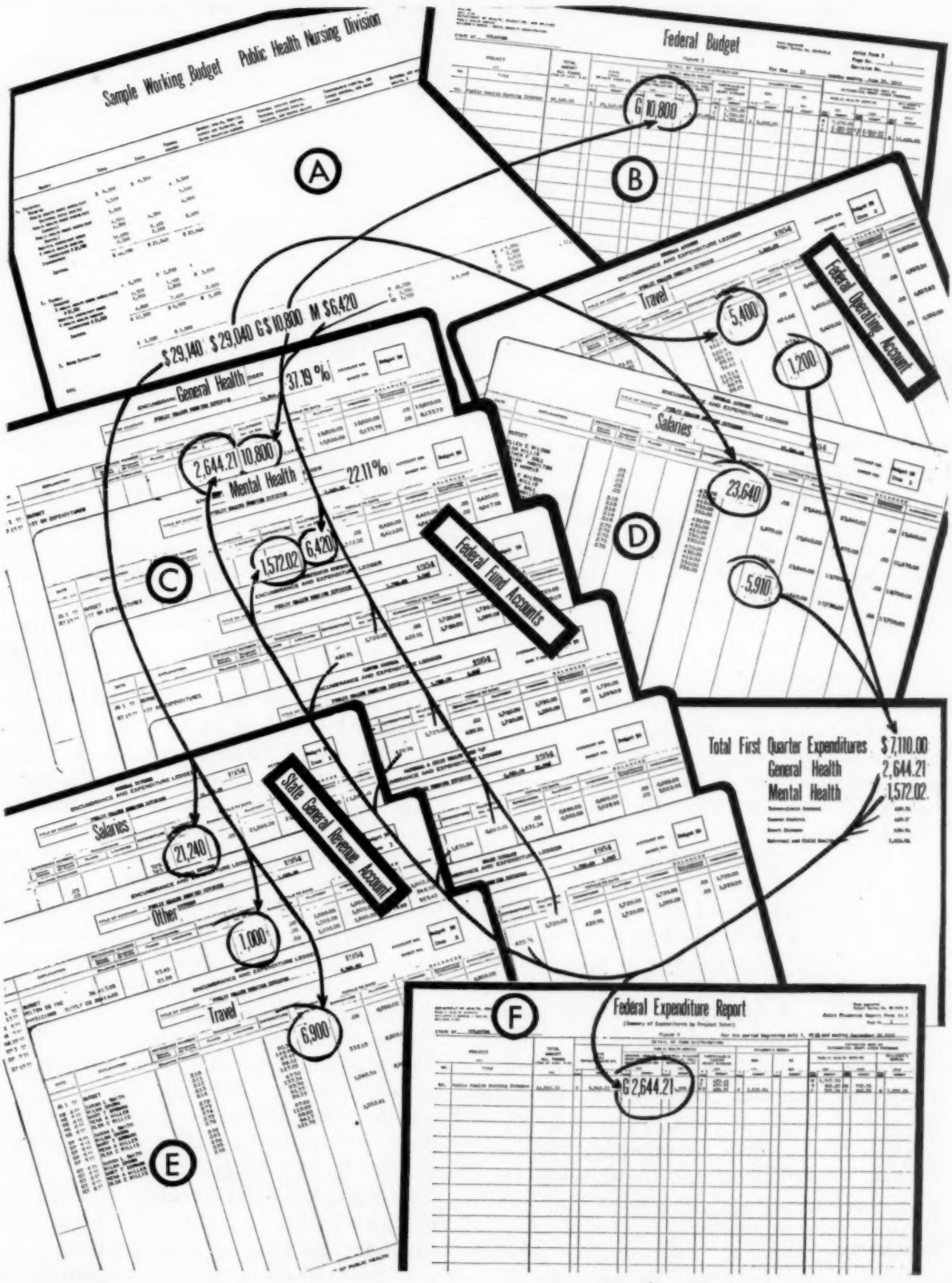
Relationships between budgets, accounts and reports—Oklahoma State Department of Health ➡


Sample Working Budget Public Health Nursing Division
A
Federal Budget
G 10,800
B
$29,140 $23,040 G $10,800 M $6,420
37.19 %
General Health
2,644.21 10,800
Mental Health
22.11%
1,572.02 6,420
C
Federal Fund Accounts
Travel
5,400
1,200
Federal Operating Account
Salaries
23,640
5,910
D
Total First Quarter Expenditures $7,110.00
General Health 2,644.21
Mental Health 1,572.02
Salaries
21,240
Other
1,000
Travel
6,900
State General Revenue Account
E
F
Federal Expenditure Report
G 2,644.21

Form 3. Work papers for transfer to and from Federal fund working reserves

Budget	Federal account	General health	Mental health	Tuberculosis control	Cancer control	Heart disease	Maternal and child health, A
	Transfers to working reserve						
No. 90, item 2	$150	$55. 78	$33. 17	$8. 88	$8. 88	$8. 88	$34. 41
	Transfers from working reserve						
No. 90, item 1	$240	$89. 26	$53. 06	$14. 21	$14. 21	$14. 21	$55. 05

count ledger to which the total amount of lapsed funds is posted. Proportionate shares of the amount lapsed are at the same time posted to individual working reserve accounts in the categorical fund ledgers. An example of work papers used as a basis for posting transfers to and from the working reserve accounts is given in form 3.

As shown in the example a project budget may be augmented by transfers from working reserve. If transfers from individual categorical fund working reserves are made in the same proportion as the original project fund percentages, no change results in the percentage of each Federal fund in the project. However, if transfers to a project are not in the original percentages, new project percentages result. In the latter case, transfers to a project are desirable only at the beginning of a fiscal quarter. If only a single Federal fund is involved in a project budget, this practical date limitation on transfers into a project budget does not exist, since the single Federal fund is at all times 100 percent of the Federal fund involved.

Supplemental budgets, utilizing previously unbudgeted Federal funds, would be most timely at the beginning of a quarter, since their effect on Federal fund percentages is the same as that caused by the transfer of funds to a project from working reserves.

Conclusions

A year's experience with the operation of a single Federal account has been entirely satisfactory. A real advantage results in carrying out a generalized project, since it is not necessary to trace nine categorical funds to final utilization in order to comply with the regulations governing each fund. This system is particularly advantageous in the handling of expenditures for local health departments. As an example, lapsed funds derived from a vacant nursing position payable from maternal and child health funds formerly could not otherwise be used except for other activities within a maternal and child health program. Under this plan lapsed funds derived from a vacant nursing position payable from the Federal account are transferred back to the working reserve account in proportion to the contributions made to the project from each of the funds. Therefore, only that portion chargeable to maternal and child health funds needs to be reserved for other activities within the maternal and child health program.

The more obvious advantages of the single Federal operating account are:

1. Simplification of budgeting.
2. A very material time saving in coding and posting vouchers and requisitions.
3. A single monthly reconciliation with the State comptroller instead of a separate reconciliation for each Federal fund.
4. A single Federal account with the State treasurer and comptroller which materially simplifies the work of these officials.
5. A single cash balance which facilitates processing of payrolls for the first month of the

fiscal year when Federal payments are often delayed.

A quarterly determination of project expenditures based on percentages of Federal funds and posting to categorical fund ledgers is an additional task under the plan. Additional computations and postings are also necessary in the handling of working reserve accounts. However, based on a rough survey, we believe that time involved in Federal fund accounting is reduced at least one-third under this plan.

On the whole, the plan results in economies and operating flexibility. We would recommend that State and Territorial health departments explore its possibilities for use in their organizations.

Coliform Detection in Water By a Single-Step Technique Using the Membrane Filter

By A. A. Hajna, M.S., and S. R. Damon, Ph.D.

THE SUCCESSFUL ADAPTATION of buffered desoxycholate lactose broth for use in the examination of water by the millipore filter (MF) technique and the reduction of the analytical process to a single step procedure are reported here.

In 1951, Hajna proposed a buffered desoxycholate lactose broth for use either as a presumptive or as a confirmatory medium in the examination of water (*1*). The inclusion of sodium desoxycholate in his medium was presumed to inhibit growth of spore formers and other gram-positive bacteria without affecting the growth of the coliform group organisms which were detected in the usual manner by the collection of gas in the fermentation tubes.

More recently, the MF and special indicator broth media for detection of coliform bacilli in water have been advocated by Goetz and Tsuneishi; Clark, Geldreich, Jeter, and Kabler; and Clark and Kabler (*2–4.*) In this technique, the presence of coliform organisms is detected by the production of typical sheen in the colonies growing on the filter rather than by gas formation from lactose. In the technique as proposed by the Environmental Health Center (EHC) workers, two steps are necessary: (*a*) enrichment of the membrane for 2 hours, and (*b*) transfer of the membrane from the enrichment medium to a basal medium for the development of colonies and the production of sheen. Thus the method advocated by the EHC workers requires the use of two different media and the transfer of the membranes.

Critical comparisons of quantitative results by the MF technique using desoxycholate medium and the standard methods lactose broth fermentation procedure are under study at the present time.

Mr. Hajna is bacteriologist in charge of the membrane filter studies at the bureau of laboratories of the Indiana State Board of Health, and Dr. Damon is director of the bureau and has served as chairman of the Conference of State and Provincial Public Health Laboratory Directors.

The Indiana laboratory is one of the laboratories participating in the field study of the membrane filter under the auspices of the Standard Methods Committee for the Examination of Water and Sewage, American Public Health Association, and cosponsored by the American Water Works Association and the Public Health Service.

Apparatus

The filtering apparatus and the method of vacuum filtration is similar to but differs somewhat from that of the EHC workers, although the principles involved are essentially the same. The apparatus consists of a cone-shaped funnel (*A*) attached to a special filtrator (*B*) instead of the hydrosol type as used by the EHC workers. Vacuum comes from a central source.

In the study, the funnel was at first sterilized at 15 pounds steam pressure for 15 minutes, the 2 parts of the funnel being separately wrapped in kraft paper before autoclaving, according to the method advocated by the EHC workers. Subsequently, it was found that sterilizing the funnel for 30 minutes in the Arnold sterilizer (100° C.) was satisfactory.

Medium and Indicator System

Leifson (*5*) stated that in a broth or agar medium containing sodium desoxycholate below pH 7.5 none of the gram-positive bacteria tested show any appreciable growth in 24 hours, but if the pH of the desoxycholate medium is raised above 7.5, various types of gram-positive bacteria begin to grow. For example, at pH 7.6

the enterococci will generally show very tiny colonies on desoxycholate agar after 24 hours incubation. In conformity with Leifson's findings, the authors have found the formula best suited for the enumeration of coliforms in water is that given below, with a pH of 7.5.

Some peptones have been found to be unsuitable for use in this medium. Sheen was either not produced at all or, at best, poorly produced. The most satisfactory peptones were found to be:

BBL trypticase in combination with BBL thiotone; or simply the BBL polypeptone (a mixture of trypticase and thiotone).

Bacto casitone in combination with Bacto thiopeptone.

Albimi C in combination with Albimi B (or simply the Albimi "M", a mixture of the aforementioned peptones).

Although Bacto neopeptone, Bacto tryptose, and Bacto proteose peptone No. 3 may be used in the basal medium formula, they are generally unsatisfactory unless an enrichment broth is first used.

Lactose is incorporated in the formula rather than prepared as a separate solution to eliminate superfluous steps. Furthermore, heating lactose at 100° C. is preferable to autoclaving the lactose solution separately at 121° C. for 15 minutes.

Ultimate determination of the amount of sodium desoxycholate to be used per liter was based on the demonstrated sterility of the finished medium after heating for 30 minutes at 100° C. This concentration does not affect the ability of the coliform types to produce colonies with sheen, and at the same time does not support growth of the gram-positive bacteria or spore-formers, normally present in the air, which might get into the sample during filtration in the open funnel.

The desoxycholate lactose broth formula found best suited for the enumeration of coliforms in water was arrived at only after numerous trials with various brands of peptones, variations in the concentration of each ingredient, trial of different methods of sterilization and tests of the effect on the medium of storage at room and icebox temperatures.

Desoxycholate Lactose Broth

To 1,000 ml. of distilled water, add:	
Peptone (tryptic digest of casein)	10 gm.
Peptone (peptic digest of beef)	10 gm.
Yeast autolysate, or extract	3 gm.
NaCl	5 gm.
Lactose	20 gm.
K_2HPO_4	6 gm.
Sodium desoxycholate	0.2 gm.
Final pH will be 7.5	

Agitate the medium thoroughly to dissolve the ingredients. Heat to the boiling point to permit formation of precipitates; filter through coarse filter paper, and dispense with a pipetting machine in 30 ml. amounts in 25 x 200 mm. sterile cotton plugged tubes. Sterilize the tubes of measured medium in flowing steam (100° C.) for 30 minutes and then refrigerate until ready for use. Before using, the tubed medium is warmed in a beaker of hot water for a few minutes to dissolve the desoxycholate "gel."

Indicator System

The choice of the indicator system was based on the demonstrated ability of all coliform types (*Escherichia coli*, *Escherichia freundii*, *Aerobacter aerogenes*, and *Aerobacter cloacae*) to form colonies with typical sheen. The indicator solution consists of the following ingredients thoroughly mixed together in a 16 x 150 mm. tube:

Sodium sulphite (0.9 gram in 10 ml. water)	1 ml.
Basic fuchsin (3 gm. in 50 ml. water plus 50 ml. 95 percent ethyl alcohol)	1.2 ml.

To each tube of 30 ml. desoxycholate lactose broth, add 1.54 ml. of the indicator solution and agitate until mixed well. The tube of final medium should stand at room temperature for 30 minutes before the absorbent pads (50 mm. in diameter) are saturated with 2.2 ml. of the broth. After saturating the pad, the filter membrane is placed on the pad within a covered petri dish and incubated at 37° C. for 18–24 hours in an inverted position in an atmosphere saturated with moisture.

Results

Approximately 150 samples of water were examined for their coliform content using 5

portions of 10 ml. each inoculated into standard lactose broth, followed by confirmation in brilliant green lactose bile broth, in parallel with the filtration of a 50 ml. portion through the MF and observation of sheen producing colonies when desoxycholate lactose broth was used as the basal nutritive medium. The results of these comparative tests are given in the table.

Medium	*Number*
Lactose broth / Millipore filter — both showing coliforms	50
Lactose broth / Millipore filter — both negative for coliforms	72
Lactose broth—positive (by B. G. lactose bile, 2 percent)	8
Millipore filter—negative. Lactose broth—negative. Millipore filter—positive (coliforms)	17
Total water samples examined	147

It is evident that while there were 8 samples positive by the standard lactose broth fermentation procedure in which the MF tests were negative, there were twice as many in which the MF tests were positive and the lactose broth fermentation tests negative. Furthermore, 15 samples, in which positive lactose broth tubes were observed, failed to confirm in brilliant green lactose bile, and in none of these samples were sheen producing colonies observed on the filters.

Conclusions

1. A single step procedure for coliform detection in water analysis using the millipore filter has been described.

2. The formula for a desoxycholate lactose broth to be used in the MF technique is given.

3. An advantage of the desoxycholate lactose broth medium in the MF procedure for water analysis lies in the fact that enrichment of the filter is eliminated.

4. With this technique results are obtained earlier than by standard methods of water analysis.

5. Many of the false positive lactose broth tests encountered in standard methods of water analysis are eliminated.

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The State of the Nation's public health services

Three key papers from the 52d Conference of the Surgeon General of the United States Public Health Service and the Chief of the Children's Bureau with the State and Territorial health officers, mental health authorities, and hospital survey and construction authorities—November 4–7, 1953 . . . a fourth paper, the banquet address of the 11th meeting of the Association of State and Territorial Health Officers . . . notes on the history of the Surgeon General's Conference.

Toward Critical Evaluation Of Federal Participation In State Health Programs

1 **By Nelson A. Rockefeller**
Undersecretary of Health, Education, and Welfare

These annual conferences are unique in several ways. They exemplify the most effective type of Federal-State partnership in action. Through this mechanism—established by the wisdom of Congress—you have developed a true forum for the free exchange of ideas and a unified attack upon numerous health problems. You have created an atmosphere of mutual respect and trust which permits frank and open discussion. This history of harmonious Federal-State relationships in public health has not come about by chance. It is the result of a half century of arduous work and firm determination to realize a common goal.

A review of the proceedings of these conferences over the period of years is most revealing—they are historic documents. Surgeon General Wyman in addressing the very first annual conference held under the law—in 1903—evidenced keen insight and a rare gift of prophesy when he said:

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"One of the most important features of this assemblage is its official character. All of us are familiar with conventions of similar purpose, productive of much useful information but entirely lacking in official significance. Here, however, are assembled the legalized health authorities of the States, representing the practical administrative experience as well as the theoretical and scientific knowledge required in the consideration of public health affairs.

"[This is] a most noteworthy event. For the first time in the history of the United States there has been placed within its statutes, by the act of Congress . . . a provision looking to harmonious and cooperative efforts in public-health matters between the National Government and the State governments."

As a newcomer to this long-standing and honorable partnership, I have less first-hand knowledge than you of the specific and dramatic gains which have resulted in public health. My long association with the health activities of the Institute of Inter-American Affairs, and for 20 years as a member of the Westchester County Board of Health, has given me considerable experience in this field of public health. In traveling the highways and the byways of Latin America, as the Institute program was developing, I have had a liberal education in the substantial results that can be accomplished through the joint efforts of a variety of organizations. So I share your pride in the progress which has been made here in the United States—progress which has been made possible only through the national and State governments working together as a well-organized team, in full cooperation with local governments, with voluntary health agencies, and with the private physicians of each and every community of this broad land.

Problems of Today

But remarkable as the public health accomplishments of the past fifty years have been, there still remain challenging problems to be solved.

Conditions which at present are the chief causes of sickness, disability, and death may prove more difficult to conquer than those problems to which public health workers first addressed their efforts—and which already have responded to public health measures.

Then, too, there are questions about the particular share of the cooperative job which each of the partners should rightfully assume in meeting today's health needs. What part can best be supplied by the States and localities? What contribution is the Federal Government best equipped to make—and under what circumstances?

One has only to scan the agenda of your working committees to see that these are matters of interest to you in the States, as they are to us here in Washington. It is for the purpose of considering such mutual problems as these—of looking forward rather than backward—that I regard this meeting today with the chief health authority of each State and Territory as a real opportunity.

First, it permits me to comment briefly on the significance of some of the major changes which have occurred in the executive branch of the Federal Government since your last annual conference. With a change in administration comes new leadership—and with new leaders come fresh points of view—perhaps even different goals.

President Eisenhower has a deep personal interest in the health programs of this country. He has abiding convictions concerning the dignity and worth of each individual member of our free society, and steadfastly believes that the individual can develop to his fullest capacity as a productive member of this society only if he enjoys good health—both physically and mentally.

Department Status

The President's first move in reorganizing the executive branch was the proposal to lift the essential health, education, and social welfare functions of the Federal Government to department status. This was accomplished by Congress on April 11 of this year.

For the first time in our national history, these social responsibilities—in the broadest meaning of the term—are represented at the

highest council table of our government—the President's Cabinet. Health, education, and social welfare have become an integral part of the considerations of the President's official family.

There are many facets of the new Department in which you would be interested. Time permits me to mention only a few organizational aspects before passing on to my main topic.

One step toward effective administration of the Department was the establishment by the Secretary of the Departmental Council. Together with the Secretary and other senior officials, the Council is composed of heads of the Public Health Service, Office of Education, Social Security Administration, Office of Vocational Rehabilitation, Food and Drug Administration, and Saint Elizabeths Hospital. An improved interchange of information and closer coordination of the Department's activities through the work of the Council are results already apparent.

The reorganization plan which established the Department provided the Secretary a deputy, the position of Undersecretary, which I have the honor to occupy, two Assistant Secretaries, and a Special Assistant for Health and Medical Affairs. In addition, the Secretary has several staff assistants. All these people make up a corps of associates to aid the Secretary in administering the Department.

The appointment of a Special Assistant, Dr. Chester Scott Keefer, to advise the Secretary on the Department's health programs and activities signifies the importance of health in our affairs. Dr. Keefer is concerned with the total health interests of the entire Department, not just with the Public Health Service's activities alone. One of his functions is to maintain liaison with the leading professional societies and voluntary organizations in the health field. His broad background in research and medical education will be extremely valuable to the Secretary and the Department in reviewing current programs and making plans for the future—plans in which your organization, working with the Public Health Service and Children's Bureau, will play a vital part.

The particular type of Federal-State partnership under which you work as public health officials has an outstanding characteristic; its responsiveness to change. This is inevitable.

Your programs are directly affected by, and must be closely geared to, many types of change: changes in the public health problems you are called upon to solve; changes in populations you serve; changes in broad national and international situations. These last, though not specifically matters of public health, have a strong impact upon the provision of health services.

Because State health officials are sensitive to the importance of and need for continuous evaluation of their programs and because you

The Responsibility of Health Officials in Civil Defense

Midway in his prepared address, Mr. Rockefeller was interrupted by a civil defense air raid drill. On his return to the rostrum he remarked to the State health officials:

I couldn't help thinking, when we were going down to the basement, of the terrific responsibility which you men and women who sit in this room will be carrying if, instead of this being a practice raid, there is a real raid on this country.

One of the things which deeply concerns the Secretary, and with which Dr. Scheele and various others in our Department are preoccupied, is the problem which the United States will face should the tragedy of a bombing occur.

As one studies it, and I am sure that all of you who have State Civil Defense groups know, the problems that we are going to be up against as a Nation are almost inconceivable. And I don't think there is any group in the country assembled, or that could be assembled, which could more importantly carry that responsibility if it comes—and we all pray to God it won't—than you who are sitting in this room.

It has a very sobering and serious impact when one gets to thinking about it. We hope, as the coming year starts, to be able to more effectively than in the past work with you in devising and preparing for that eventuality which, as I say, we hope never comes.

are accustomed to periodically taking stock of your methods of doing business, you will agree, I think, that the beginning of a new administration is a logical time to examine carefully the road we have traveled. Possibly there is need to rechart the course ahead.

The Department of Health, Education, and Welfare is particularly concerned with critical evaluation of Federal participation in State health programs, both through grants-in-aid and through technical assistance.

Grants-in-Aid

One of the basic objectives of the new administration is to achieve greater efficiency and economy throughout government. Not only Congress, but every department and agency head of the executive branch has a strong determination to accomplish this purpose. The force of this broad and desirable objective is felt in the appraisal of all present and proposed activities. The first Presidential message to Congress emphasized that the number one order of business was elimination of the annual deficit. The sacrifices this will entail were clearly recognized.

> "This cannot be achieved merely by exhortation. It demands the concerted action of all those in responsible positions in the Government and the earnest cooperation of the Congress. Getting control of the budget requires also that State and local governments and interested groups of citizens restrain themselves in their demands upon the Congress."

Under this mandate, the Department is giving much thought to the complex question of Federal assistance to States and localities. First let me state, categorically, that grants to health activities will continue. Most people freely acknowledge the necessity of government programs to protect and improve the public health. Indeed, public health services have become an established part of State and local government services.

The issue, then, is not whether a given function should be dropped or continued, but how can it best be performed and supported. It

Is Public Health Too Much "Taken for Granted"?

While discussing grants-in-aid, the Undersecretary interjected some comments about his own personal experiences on a county board of health. Mr. Rockefeller said:

During the twenty-some years during which I have had the privilege of being on the Westchester County Board of Health, I have had the opportunity of tracing the development of many of the programs with which all of you are familiar. One of the problems which we found in Westchester was the fact that the public took for granted many of these services. Many of them they weren't even aware of, and so we took on, just before the war, a job of trying to educate our own citizenry in Westchester as to what they were getting from their county health department.

That had, quite naturally, a relationship to the appropriations which the health department received, or didn't receive, from the Board of Supervisors. We felt—and I think rightly so—that you can't expect an intelligent citizenry to support programs which they don't know about, or don't understand, or don't fully appreciate.

It seems to me this is one of the responsibilities all of us have, particularly in this period when funds are short, when budgets are strained, when taxes are high. The voter and the representatives of the people are bound to look over the items that appear in budgets with great care, and they are going to cut out those that they either feel are less important, or those they don't understand.

It's a lot easier to cut out those you don't know about, because they don't have very much significance. And I think that is something we, frankly, all have to keep in mind at this time.

Our citizens fully appreciate the tremendous heritage they have in this country, and the tremendous asset in these basic health services which, too often, we found in Westchester were taken for granted.

Getting back to the question of grants-in-aid: The public health services have become an established part of State and local government services. And, perhaps, as I look, established too well. They are almost overlooked, at times, which is a serious thing.

would be a happy solution if each separate function could be clearly allocated to one level of government or another. Then there would be no possibility of overlapping authority, duplication of effort, or conflicts of points of view.

In reality, such clear-cut distinctions cannot be made. The States and the Federal Government are interdependent in the fight against health hazards which affect all States.

Since the people of the Nation move freely and frequently from one State to another—and it is a mark of both our freedom and unity that they can do so—and since disease ignores State boundaries, the health and productive capacity of the residents of one State are of interest and concern to all other States.

Financial Interdependence

It is becoming increasingly clear that, in terms also of financial support, complete separation of the health functions of State and Federal governments is impossible. The kind of tax system under which our governments are now financed places much of the total tax-paying ability of the country in a limited number of States. Other States lack the resources to carry on, unaided, some of the most essential services. Bringing the problem to a head is the fact that in those States where the income is lowest, many of the needs for health services are greatest. Here the Nation as a whole has responsibility, particularly for strengthening those State and local public health services of national and interstate significance.

The Federal Government also has a vital role to play in encouraging the development of new programs and techniques designed to overcome major public health problems. When, through research and other scientific investigations, more effective methods become available for combating ever-changing health problems, assistance should be available—at least for a limited period of time—to assist the incorporation of these techniques into public health operations on a nationwide scale.

We believe, too, that it is appropriate for the Federal Government to provide special financial aid to unique projects which give promise of solution to special problems and to a limited number of areas with unusual health problems: areas with exceptionally high incidence of disease; areas with concentrations of Federal activity, such as defense or military installations; areas with major interstate problems, such as health services for migratory labor groups; areas with "pilot plant" operations to develop knowledge or techniques for general application, to name a few.

Technical aid is also an important type of assistance with which the Federal agencies can continue to assist the States. The useful role of the Federal Government in the fields of health and welfare depends, to a considerable extent, on the quality and availability of its technical and professional services.

Maximum Opportunity, Minimum Control

As we administer our grant-in-aid programs, we are aware of the dangers of centralization of control in the Federal Government. But these dangers can be averted if our Federal-State partnership is governed by one simple and historically sound motto, "Maximum opportunity for State decision, and minimum Federal control." As we continue our appraisal of grants-in-aid, we are carefully examining all our requirements in a soul-searching effort to abide by this watchword.

The need for rational solutions to fundamental problems of Federal aid to States was recognized by President Eisenhower early in his administration. He requested Congress to authorize the establishment of a Commission on Intergovernmental Relations to study and to make recommendations to him and the Congress on Federal-State responsibilities and fiscal relationships.

In his message to Congress on the subject, the President said:

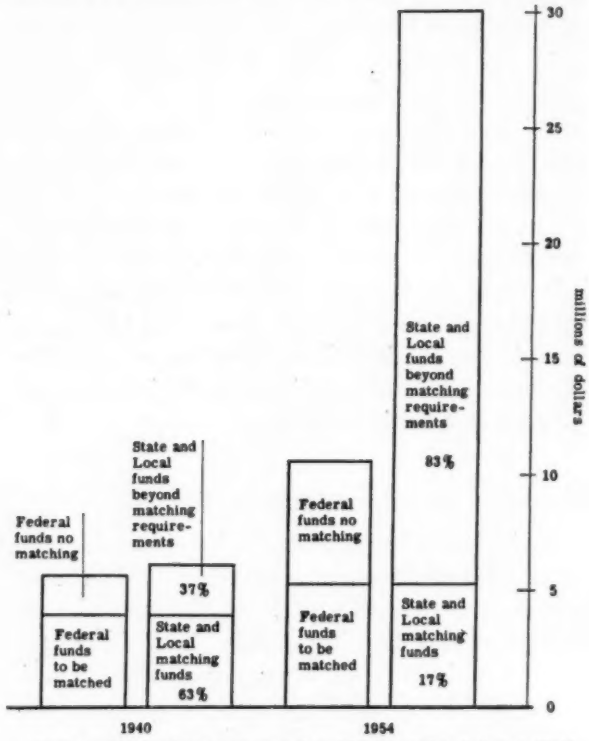
> "The commission should study and investigate all the activities in which Federal aid is extended to State and local governments, whether there is justification for Federal aid in all these fields, and whether there is need for such aid in other fields. The whole question of Federal control of activities to which the Federal Government contributes must be thoroughly examined."

Organization of this commission is now complete. The findings of this commission will undoubtedly make a great contribution to our thinking and understanding of these relationships.

I reiterate that the problems I have mentioned are shared problems—important to the State and Federal groups alike. They are a continuing challenge to the cooperative approach you have taken to similar problems in the past. Keen imagination is called for all along the line if the entire country is to enjoy maximum health services at minimum expense. The good health of our people can never be taken for granted. Vision, vigor, and courage on the part of public health leaders are as necessary today as in the past.

But necessity has always been the spur to ingenuity. I am confident that there are many untapped resources and undevised methods for the provision of better health services. I am hopeful that in your work together here this week you may discover the key to some of them.

State and local funds exceed matching requirements for maternal and child health programs.



NOTE.—No budget reports for 1954 received from California, Connecticut, Massachusetts, New Hampshire, New York.

Child Health Programs: Federal-State Funds And Current Problems

2 **By Martha M. Eliot, M.D.**
Chief of the
Children's Bureau

In some respects this has been a rather special year in the Children's Bureau—one of stock-taking and reviewing many aspects of our work.

We have been giving a good deal of thought to the principles basic to grants-in-aid and to the relationship of Federal grants to the development of State maternal and child health and crippled children's programs. We are asking ourselves and we are being asked such questions as, "What are the appropriate roles of the Federal Government in relation to the work of State health departments?" and "What effect, if any, have the Federal grants had on State and local appropriations for public health activities?" Such questions and others will, of course, continue to be studied by the administration and the Congress.

I would like to report to you some statistics which we have recently put together related to the maternal and child health programs. They show the growth of these programs in States and localities in the past 14 years, and illustrate what can happen when Federal, State, and local governments combine their resources to meet child health needs. Let me tell you just what has happened.

State Funds Increase

In 1940, the State and local maternal and child health programs were financed by a budget of about $11.5 million. Of this, $6 mil-

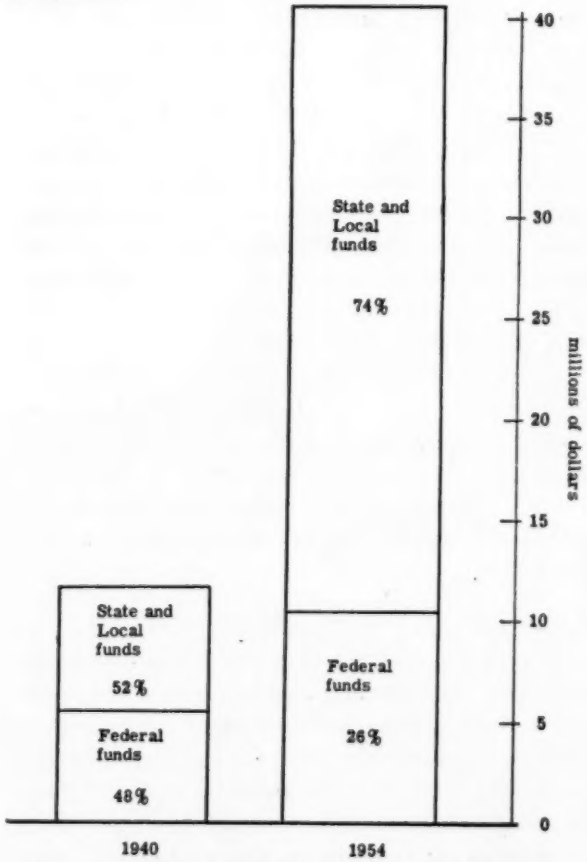
lion were from State and local funds, $5.5 million from Federal funds.

For 1954, the total amount budgeted is $40.5 million, or nearly four times as much as for 1940. The States today put up more than $30 million, the Federal Government $10.5 million.

Clearly the expansion of State and local funds for child health has been much more rapid than that of Federal funds. From the beginning of this cooperative program the States have put up, in the aggregate, more than enough to match the required amount of Federal funds. By 1940, State and local funds were 37 percent in excess of the amount needed for matching. This year, 1954, 83 percent of the State and local funds is over and above what is required for matching.

We can contrast the contributions from Federal and State sources in still another way.

State and local funds have increased more than Federal funds for maternal and child health programs.



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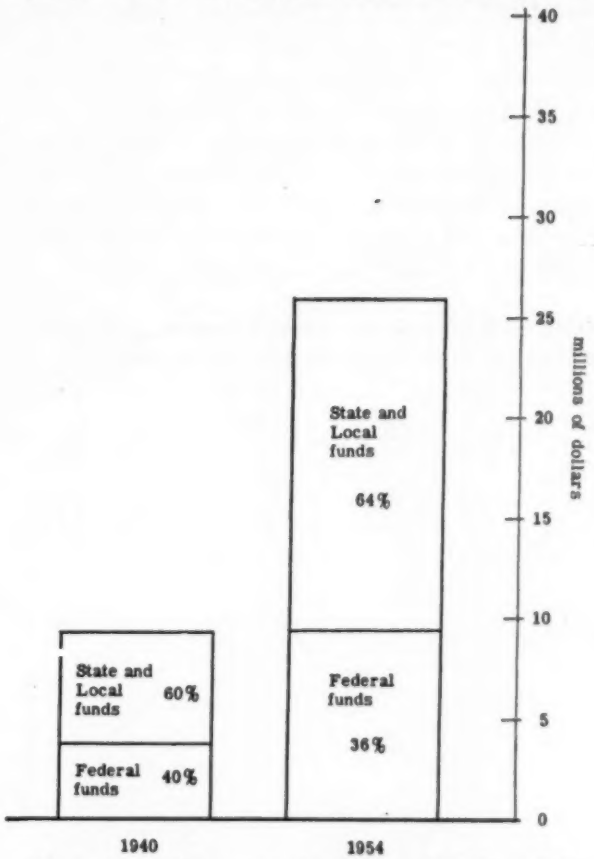
State and local funds have increased more than Federal funds for crippled children's programs.



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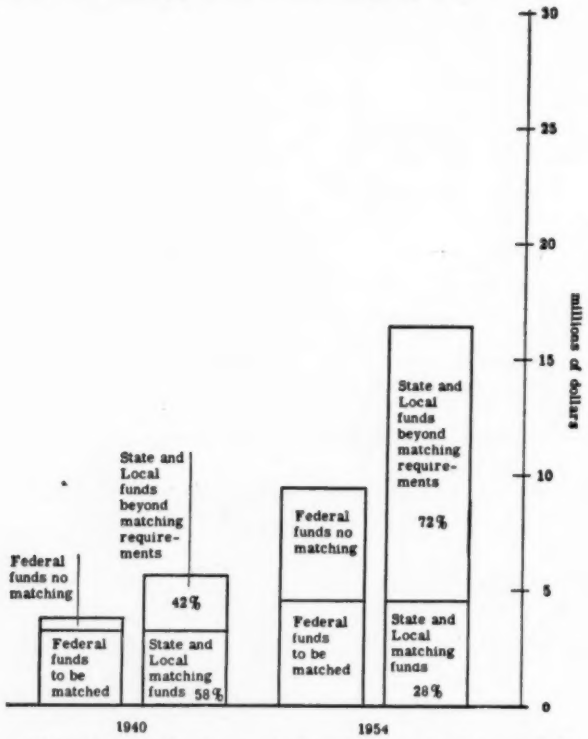
In 1940 the Federal contribution to the combined budget amounted to 48 percent of $11.5 million. Today, 1954, the Federal contribution is only 26 percent of $40.5 million.

The conclusion that we draw from this is that Federal grants have clearly served to draw out additional State and local funds. Similar data have been prepared on the crippled children's program and similar conclusions can be drawn here as in the maternal and child health program. In the crippled children's programs the differences are not so striking since local funds play a less prominent role in this more highly centralized State program.

Of course these statistics represent totals of all the States and do not, by themselves, bring out the considerable variations that exist from State to State with respect to fiscal ability. The fact that the fiscal capacity of the States

vary, together with the fact that the poorer States have relatively more children, suggest that the Federal Government can help reduce the inequities in opportunity for children to receive needed health services. By distributing grants so as to help equalize the opportunities for health services within the Federal-State grants-in-aid programs, the Federal Government is making a significant contribution to children and recognizing that their health and welfare is of national concern and interest.

State and local funds exceed matching requirements for crippled children's programs.



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Progress of the Programs

During these years State health departments and crippled children's agencies have used their funds with great imagination and insight. Let me give you an example. As infant mortality has declined and as the leading causes of death in infancy have changed, the health departments have increased their services to infants in the neonatal period, particularly those for prematurely born infants. The majority of the States are now assisting hospitals in improving their maternity and newborn infant services and facilities. They are loaning incubators to hospitals and local health departments. They are enabling nurses and physicians to receive additional training in the care of newborn and premature infants. Some are making special studies of prematurity. In many other types of activities, the States are emphasizing the importance of this aspect of the maternal and child health program. The medical and hospital care programs for premature infants which 16 States have developed are of particular interest. As a result of all these activities, greater attention is again being given to prenatal care, particularly for mothers with complications of pregnancy, in an effort to reduce the incidence of premature birth. A number of health departments are now studying the problems of fetal deaths as well.

School Health

Much progress has been made in the provision of health services for school-age children. Many of you can recall the dreary wholesale medical inspections which not so long ago constituted this program. We have broken away from tradition in school health services to a healthy degree. Emphasis is now on appropriate screening methods, especially for hearing and vision, on teacher observation and public health nurse consultation, on health education, and upon using the skills of the physician for examining selected children or those in a few selected grades, and for consultation. There is less emphasis today on whether it is properly the school's program or the health department's and more emphasis on the community's program for children, bringing together the public and private resources of the community.

Crippled Children

During the first few years of the Social Security Act, the crippled children's program was virtually synonymous with orthopedics. Perhaps in the last few years we may have let the pendulum swing too far the other way with the result that not enough attention has been given to new developments in the orthopedic program. The progress that has been made in orthopedic services and in research in this field

has been great, stimulated in part by the war. Of much current interest is the renewed attention being given to children who have limb amputations. The National Research Council has a Joint Committee on Artificial Limbs which is working with the Michigan Crippled Children's Program to develop a plan for making new types of prosthetic appliances available to children in the program.

Hearing Aids

I am reminded, too, that during the war great progress was made in the new science of audiology and in the development of new hearing aids. I think it quite probable that children have been more greatly benefited than adults by this research in audiology. We are looking forward to similar benefits for children from the research now in process on the structure of artificial limbs and braces.

But the crippled children's program is today more inclusive than orthopedics or plastic surgery. As the programs have broadened, the proportion of children with orthopedic conditions has declined. During 1952, about one-half of the 238,000 children receiving physicians' services in the crippled children's program had orthopedic diagnoses. The other half includes those having cerebral palsy, ear conditions, rheumatic fever, cleft palate, and other conditions requiring plastic surgery, eye conditions, epilepsy, and other neuromuscular conditions. The greatest relative increase in the past few years has been in the number of children with eye conditions, and children who have epilepsy.

Team Concept

One of the great contributions the crippled children's program has made to medicine and public health is the team concept in the care of children, particularly those who have long-term handicapping conditions. The recognition of the essential contribution made, not only by the physician, but by the nurse, the medical social worker, the nutritionist, physical and occupational therapist, constitute a landmark in interprofessional relationships. And closely associated with the staff of crippled children's programs are the staffs of the welfare, vocational rehabilitation and special education agencies. In fact, at certain times in the care of crippled children, these workers virtually become members of the team.

Personnel Resources and Education

A few words about the increase in specialized personnel over the past decade or more will, I think, be of interest, particularly to those of you who have been associated with these programs for a long time.

In 1947 there were 20 specialized maternal and child health consultant nurses in health departments in 19 States; in 1952 there were 81 such consultants in 44 States.

At the beginning of the program in 1936, there were 9 nutritionists in 3 States' health departments; in 1953 there are 202 nutritionists in 41 States and Territories.

In 1936, only 2 departments employed medical social workers for their maternal and child health and crippled children's programs; today there are 375 medical social workers in 48 State health departments and crippled children's agencies.

In 1937, 3 State crippled children's agencies employed 5 physical therapists; in 1953 there are 147 in 40 States and Territories.

Growth of Training Programs

Much of this progress has been made possible by a remarkable growth in training programs and by changes in curriculums in academic institutions. The schools of public health are all now offering courses in maternal and child health and some of them offer majors in maternal and child health. In addition to the many courses offered for the training of the specialists I have just mentioned, there are new training opportunities for workers in such specialized fields as audiology, prematurity, rheumatic fever, epilepsy, cerebral palsy, children's dentistry, many of which are supported by the States with funds granted by the Children's Bureau. Most of these courses give particular emphasis to the community or public health aspects of these programs.

Public Health Influence

The influence of public health programs is also being felt in medical schools. A major

development in the training of medical students which has significant potentialities for public health is the concept of "comprehensive medicine." This concept includes consideration of the patient as an individual who has family and community relationships which have a bearing on his health. Some of the schools are assigning a family to each student for his 4 years of medical training and he learns to serve as a family health adviser. These students are supervised by the faculty and are assisted in understanding the social and emotional components of health and illness by medical social workers. Community health facilities, such as prenatal clinics and child health conferences, are being used in this training plan. Such students will graduate with a far better understanding of public health and preventive medicine than the graduates of even a decade ago.

Unfinished Business

This is necessarily a very sketchy summary of some of the highlights of progress you have made in the maternal and child health and crippled children's programs. We can all of us be justifiably proud of this record, in which the facts speak for themselves. But there is no room here for complacency, or for a feeling that the job of protecting and promoting the health of mothers and children is just about done, or at least well on its way. We have, in fact, made an excellent beginning, but not much more than that. There is an enormous amount of unfinished business that lies before us.

Infant Mortality

Consider for example, some problems of infant mortality. A recent analysis of vital statistics tells us the neonatal mortality rate for full-term newborn infants is less than 8.0 per 1,000 live births. But for premature infants the rate is 174.0 per 1,000 live births or more than 20 times as great. It is easy to see why so much emphasis is being placed on prevention of prematurity. As impressive as the decline in infant mortality has been, we must keep in mind that 10,000 infants could be saved each year if all counties had rates as low as those with cities of 50,000 population or more. This illustrates again the need for our maintaining a special interest in children in rural areas. The disparity in maternal mortality between high and low income States is excessive, being 5.9 per 10,000 live births for the former, and 13.0 for the latter. Whereas for the United States as a whole, 5 percent of births in 1950 were unattended by a physician; 15 percent of the births in the low income States took place without a physician.

Premature Births

The major problem in the maternal and child health program, prematurity, looms larger as we find out more about it. In about half of the mothers who have premature infants, the cause is obscure. But we do know that mothers in poor social and economic circumstances are more likely to go into labor prematurely than others. The average duration of hospital care for a baby in premature centers is about 30 days and the average cost of hospital care in voluntary hospitals is about $19 a day. Prematurity is, therefore, a very costly business. Only an occasional hospital insurance plan provides for the newborn infant. Undoubtedly early hospitalization of mothers who have complications of pregnancy, as is advocated by Taylor at the University of Colorado and others, does prolong gestation and reduce prematurity, but few States are providing such care even for mothers lacking other resources.

In the crippled children's program, services for children with other than orthopedic handicaps are being provided for the most part in demonstration programs which have a sharply limited geographic basis. The orthopedically crippled are not the most numerous among children who are handicapped. Yet about one-half the children who receive physicians' services are orthopedically handicapped. It is usually estimated that children who have rheumatic fever are as numerous, and there are more who have serious hearing or visual impairment. Twenty-eight States have rheumatic fever programs, for the most part demonstrations, which together provide services for only about 10,000 children a year. Services for children with other less visible handicaps are just as limited or more so. Yet these handicaps may be just as crippling as the more obvious orthopedic handicap. The job that lies before us is the translation of these

well-established demonstration programs into service programs with the same geographic coverage as the orthopedic services.

The Expense of Neglect

The problems hindering such a development are chiefly financial. We have to contend not only with the added costs of extending or developing such programs, but also with the increasing population and the increasing costs of living. There were, in 1952, 50 million children under 18 years. This child population increased 25 percent between 1940 and 1952. Costs have increased too. Hospital expenses per patient day went up 118 percent between 1945 and 1952, and close to half the expenditures in the crippled children's program are for hospital care. In the same period salaries for county public health nurses rose 60 percent and salaries of medical personnel, 52 percent. Yet, I am convinced that together we will gradually go ahead and find the ways to meet these problems and provide the services our children need. We cannot afford not to do so. The cost of neglect is too great, not only in terms of human values, but of money as well.

I have discussed thus far only some of the problems of the maternal and child health and crippled children's programs. But there are others just as pressing in which health departments and crippled children's agencies have as yet been involved only to a slight degree. I am referring to the serious situation which faces us with regard to children who are delinquent, children who are mentally retarded, and the children of migratory agricultural workers.

Juvenile Delinquency

I am sure that all of you have been hearing and reading much about the reported increase in juvenile delinquency and I am also sure that many of you have been actively working in your States and communities trying to do something about this situation.

Juvenile delinquency is not the product of any one social or personal factor, but of many. You and I know that the child's own personality, the effect of his family relationships and cultural patterns, the neighborhood in which he is raised, the economic situation, the tensions of the times, the lack of an appealing school program, various forms of discrimination, bad housing, broken homes, all these contribute to the making of a juvenile delinquent. To reduce the number of delinquent children will require great extension and improvement in many of our social institutions, and a major change in the economic and social situation in many well-defined urban neighborhoods. Health agencies have a real role to play in preventive maternal and child health services.

Mental Retardation

Each year the Bureau receives many requests for help with problems growing out of mental retardation in children. Groups in local communities and professional workers are becoming more outspoken about what they want for mentally retarded children and are taking leadership in attempts to get better facilities, training, and treatment programs for these children.

Of particular interest to all of us is the period of infancy and the preschool years when parents begin to realize that they have a retarded child. The family physician is usually the one who has the responsibility of informing the parents that they have a retarded child. This is a critical occasion, one which most physicians would rather not face. How it is done is important. The physician frequently needs psychological assistance in reaching a diagnosis. This problem is seen, of course, in your child health conferences. The parents need a great deal of help in coping with such a situation. The Children's Bureau hopes to be able to make available to you some consultation service in this field in the not too far future.

Migratory Workers' Children

The problem of the migrant agricultural worker has been with us for a good many years now and I know many of you have struggled with it. One of the major blocks to picking up on this responsibility seems to be a feeling of helplessness in doing it alone. A number of health officers have indicated the willingness of the States to do their share but have expressed their feeling of bafflement about how to deal with a group of people, present in the locality

for only a few weeks or months, who receive little or no care before coming and little or none in the places to which they go. If a group of States could get together on a coordinated plan, with the State of origin doing its part and the States along the migratory route picking up theirs, all of the States would be helping one another. We believe such a plan is possible and will be wanting to talk with some of you, particularly those from the States on the eastern seaboard, about your interest in such a project. To you who know the problem so well I need hardly add that welfare and education, along with health, must be intimately involved.

Cooperative Efforts

In working out some of these problems, particularly those involving several State agencies, many States have found it helpful to organize State committees on children and youth. Similarly, the Children's Bureau participates in the Interdepartmental Committee on Children and Youth. This Federal committee has 30 members, representing government departments, agencies, and bureaus whose work in some way relates to children and youth. Many of you, or your staff, are members of State committees on children and youth. In most of the State committees, the lay participation has been especially helpful in getting citizen support. The Federal interdepartmental committee has just entered into an agreement with the organization to which these State committees belong—The National Advisory Council on State and Local Action for Children and Youth. The agreement makes provision for an exchange of information about what is going on in the various States and between the States and the Federal agencies. We believe this will be beneficial both to State committees and to the Federal agencies. We believe it will further all our objectives.

You can see that I am greatly impressed with the progress that has been made in the programs for children and that I am equally impressed with the magnitude of the job that lies before us. I am confident that just as we have come this far together, so will we continue this highly satisfactory method of working together and continue to extend and improve services for mothers and children. Literally millions of children are depending on us.

Federal-State Partnership: Problems in Administration, Research, and Practice

3 By Leonard A. Scheele, M.D.
Surgeon General of the
Public Health Service

This Conference of the Public Health Service and the Children's Bureau with the States and Territories will go down in history as a momentous one. For the first time, the many governmental activities which concern you and us directly or indirectly have been brought together in an executive department of the Federal Government. For the first time, our mutual aspirations for the health of people everywhere, and our mutual problems are represented in the President's Cabinet by our first Secretary of Health, Education, and Welfare.

The completion and operation of the Clinical Center of the Public Health Service set another landmark in public health since last we met. I would predict that the nationwide research effort, in which the Center is destined to be a dynamic force, will produce, sooner than we think, findings capable of turning public health work upside down. The great revolutionary findings of the nineteenth century in the field of bacteriology and related disciplines brought public health into being as a scientific profession, and those same findings revolutionized the practice of medicine. Medical research is on the verge of remarkable advances in our knowledge of chronic diseases, viral diseases, and mental diseases, as well as in our basic understanding of the human organism and its functioning.

I predict that the new findings will give preventive medicine a greater force in the medical arts and sciences than it has ever had in the past. At the same time, the new findings will turn public health practice as we know it today—upside down. Our role of supporting clinical practice will take on new significance.

There are many interesting new features in the Clinical Center's physical plant, as well as many challenging research studies. Each project is designed to throw new light on some facet of diseases which are killing or disabling large numbers of people everywhere. The studies on metabolic balance in rheumatoid arthritis, on hypertension, and on hormone-producing tumors may seem remote from the activities of a public health department. The end results, however, may be of immediate concern to you and your staffs.

The mass cripplers and killers must ultimately be prevented by simple methods. Some may criticize this concept, but I insist that this is the goal of research and of medicine. Let us take, for example, certain common forms of arteriosclerosis: If we find that certain alterations in metabolism lead to arteriosclerosis—as studies reported by the National Heart Institute suggest—and if we can then find a chemical means of blocking such metabolic dysfunction, we may have a preventive technique as important to medical and public health practice as was the discovery of vitamin C in the prevention of scurvy and of vitamin D in the prevention of rickets. This may seem like a dream, but I believe we are on the threshold here at the Clinical Center and elsewhere in the United States of just such important discoveries.

Control of Noninfectious Diseases

We may also find methods capable of mass application for the prevention of some noninfectious diseases. Who would have thought, in 1943 for example, that a technique for treating the water supply to control a noninfectious disease would be discovered, developed, and put to work in nearly 800 American communities within a decade? I refer, of course, to the fluoridation of public water supplies for the reduction of dental caries in children. During the past year, the eighth annual examination of school children in Grand Rapids, where fluoridation was first applied, showed the same excellent results of past years.

The significance of the fluoridation story is this: By a single method we are able to combat a noncommunicable disease that currently costs the Nation at least half a billion dollars annually in dental bills plus untold amounts in lost time and in the ill effects of dental decay on personal health. The fluoridation of public water supplies does not prevent all caries, but it will eliminate a major segment of the problem. A goal of public health in communicable disease control has been at least to reduce a specific infection to manageable proportions. We are now learning how to accomplish the same goal in noncommunicable diseases.

It is not only possible, but probable, that the greatly intensified research program throughout our Nation will produce new, simple, and relatively inexpensive methods for community-wide attacks on far more serious diseases than dental decay. The work on environmental factors in the causation of cancer, for example, may one of these days produce the evidence and the methods we need for a forthright attack on cancerigenic agents in the environment. By this means, we might directly prevent the occurrence of a significant number of cancer cases.

Applying Principles of Prevention

We sometimes find it difficult to realize that the broad principles of prevention, environmental control and preventive therapy, may be just as applicable to the chronic diseases, mental illness, and traumatic causes of death and disability, as to dysentery, diphtheria, and whooping cough. At a recent staff meeting in the Public Health Service, we heard that a case of hoof-and-mouth disease had been reported from one of the States. All the machinery of diagnosis, confirmation, and search for the source of infection had, very properly, been set in motion. Eventually, the resources of other State health departments, the Public Health Service, and Federal-State departments of agriculture also will be drawn into the search and control effort.

I could not help remembering that every day nearly 2,000 people in the United States die of cardiovascular diseases; 575 others die of cancer; and 240 more die in accidents. Yet the combined daily loss of some 2,800 lives from these 3 major causes alone all too often creates no such surge of concern and action as does the occurrence of a few cases of a rare infectious disease.

Control of Chronic Diseases

Actually, some of the available methods for the control of chronic diseases are far less crude and costly than are the available methods for preventing the spread of hoof and mouth disease. The prevention of rheumatic fever—especially of its cardiac sequelae—is a case in point. The preventive therapy now available with sulfa drugs and antibiotics is certainly more effective and less expensive than earlier methods of controlling scarlet fever, for example. The channels for its application are the very ones that public health officers and private physicians together opened for the application of immunization against diphtheria, smallpox, and typhoid fever 50 years ago; and again for the diagnosis and treatment of syphilis 35 years ago.

Channels of Cooperation

The precise techniques and the division of labor in the control of chronic diseases may be different. The channels of cooperation between the health agency and the practicing physicians, and between them and the voluntary agencies, the hospitals, the schools, and other community facilities, however, are the same. And it is the foremost challenge to the State and local health departments to pick up the spade and do the ground breaking in opening up these channels of cooperation.

The health officer and his staff cannot take over the practice of medicine, nor is it their desire to do so. Ours is the challenge, however, to work with our colleagues in private practice, in medical organizations and specialty societies, so that a higher level of national health can be attained. Cooperation and teamwork for health should be the watchwords of all members of the health professions, regardless of the setting in which they work. Learning how to cooperate is one of the great problems before us and the extent to which we seriously explore and develop techniques of cooperation will be the real measure of our fulfillment of the trust we hold. This is true for all of us, whether we be general practitioners, specialists in private practice, hospital administrators, dentists, nurses, or public health administrators.

There should be no conflict of interests. Rather there should be harmony of interest. This assignment calls for developing our skills in the art of cooperation to the highest possible degree. It calls for imagination, persistence, and patience. All of the health professions need especially to bring to bear creative thinking on how to go about developing cooperative action for the prevention of chronic disease. We in public health and our colleagues in private practice have grown up professionally with certain established patterns of organization and operation.

The problems which confront us today cannot be solved in an identical framework in all communities. Perhaps what we need most at the present time is some communities with bold thinkers who will dare to conceive and test new patterns of organization and operation for the control of chronic disease. The communities that can come forward with such thinking may well be the pacesetters for future progress in public health.

Federal-State Relations

Consideration of the Nation's major health problems invites consideration of the future relations of the Public Health Service with the State and Territorial health officers and their staffs, the hospital, and the mental health authorities. The issue of Federal financial grants to the States in all fields is receiving the most serious attention at the highest levels of our Government. Mr. Rockefeller has described the Commission on Intergovernmental Relations, which will be concerned with governmental functions and fiscal resources, established by Congress last July. The Department of Health, Education, and Welfare also has set

up a special intradepartmental task force to cooperate with the staff of the commission. All of us are working to the end that the President's aim may be reached: namely, that the programs "be made more effective instruments serving the security and welfare of our citizens."

The question of financial grants is only one of many to be considered by the commission. However, it is certainly one of transcendent importance to the States and communities who will have to make the final decisions as to whether the services now supported in part by Federal grants are to be continued and maintained at effective levels.

If the Nation's health authorities will reflect on these developments, they will find that it requires a fresh look at the purpose of Federal grants and at the means for implementing health programs in the States and local communities. The tendency in the past has been to expect the continuation of a given grant program, whatever its category, general health, maternal and child health, venereal disease control, and so on. More and more the States should try to provide funds to cover programs once aided by Federal grants. This will free Federal funds for new programs.

Venereal Disease Control

Many of the State health officers will recall that Congress developed the very first "categorical grant" program—venereal disease control—on the principle of increasing State responsibility. The war period and the subsequent addition of other categorical programs have tended somewhat to obscure that principle. Many officials in public health, hospital construction, and mental health programs have not realized that the time would come when definite program appraisal and planning for the assumption of financial responsibility would be in order.

Our cooperative venereal disease control activity provides an example of what can be done to keep a categorical program dynamic—moving toward the goal for which it was created. In 1938, the Nation's health and medical authorities assured Congress that it was possible to bring venereal disease under control throughout the United States in a generation, or about 25 years. World War II with its accompanying increased spread of venereal infections would have set back the schedule many years had it not been for two fortunate situations: first, the swift action on the part of Federal, State, and local health agencies to set up a going program; and second, the advent of penicillin, which climaxed many years of research.

Timetable for Control

The State and the Public Health Service have never lost sight of the original goal. When the project grant program was initiated, State and Federal staffs jointly worked out a timetable for bringing venereal disease under control in each State. Twenty-four States had attained their goal by the close of the fiscal year 1953.

The timetable calls for control in the remaining States by the close of specific years, up through 1963. The Public Health Service and the armed services hope to provide continuing resources for handling the venereal disease problem in areas where direct Federal responsibility is clearly indicated. After 1963, the target year for control of venereal disease throughout the United States, the Federal Government's responsibility should be limited to surveillance against the interstate spread of disease, as in other infections under control.

This goal can be reached, but only if the States pick up their share of the burden. It will be a tragedy—nay, a disgrace—if after so many years of successful cooperative effort, after the pledge of public health to the Nation to control venereal disease, we do not attain this goal.

It may be that we cannot at the present time "pinpoint" the attainment of other public health goals with the precision we have achieved in venereal disease control. But the States and the Public Health Service should make it their joint concern and persistent effort. Your responsibility and ours is to render an account to the public of what we expect to accomplish, how we expect to attain the goals, and when. We need clear delineation of Federal and State responsibilities, including delineation of the need for Federal financial aid and State support.

Finances and Practical Appraisals

All of us realize that the combined current expenditures, Federal, State, local, and voluntary, for public health work in the United States falls far short of the amount needed to provide health services which will give the people the full advantages of modern medical and public health science. In looking ahead, therefore, we must go beyond the static concept of maintaining State and local health services at the current level. The public health, hospital construction, and mental health authorities will need to make it clear to their legislatures and their citizens that a mere replacement of reductions in Federal health grants will not be enough. More than replacement is needed if the American people are to attain higher levels of health in the future.

Additional expenditures of themselves, however, do not insure progress. Of equal importance is a more effective use of funds. Last year, I emphasized the need for a comprehensive appraisal of current public health practices, with a view to providing more effective local health services.

Inventory Studies

Many States and communities have inventoried their resources and activities from time to time; but few have measured the results of specific practices and procedures. Only by careful observation and study of local programs in various community settings will it be possible to develop reliable criteria for the improvement of current practices. Only through such studies can we test the comparable effectiveness of new and old procedures.

The Public Health Service has made tentative plans for such a study, and it is gratifying that some States and communities are preparing to inventory their programs in terms of current needs and to appraise their administrative practices. The data from these new-type inventories will be useful in connection with our study of public health practices. A complete stock-taking of Public Health Service activities and operations in the Federal-State cooperative programs also is underway. As we anticipated, the job is not easy. Our guideline is: how to get more for each tax dollar in a reduced budget, without sacrificing quality of service.

The new Hoover Commission, the Commission on Organization of the Executive Branch of the Government, is a second high policy-level group that will be concerned with health programs and organization. The commission will have eight task forces, including the following of special interest to you, the Public Health Service and the Children's Bureau; water and power resources; Government medical services; personnel and Civil Service; and accounting and budget procedures. Mr. Hoover has appointed Chauncey McCormick of Chicago as chairman of the Government Medical Services Task Force.

The scope of the second Hoover commission's mandate is considerably wider than that of the first. The first commission was restricted to proposals for reorganization and realignment of existing functions. The second is authorized to recommend abolishment of functions and activities not considered necessary to the Government, and the elimination of nonessential services, functions, and activities which compete with private enterprise. It may also recommend specific legislation.

Mr. Hoover has set December 31, 1954, as a target date for completion of the commission's legislative recommendations. Some of these may be ready early in 1954, however.

Water Resources and Pollution Control

The proposals of the commission on water resources will be of special interest to health officials. The critical situation which now faces the entire country is familiar to all of you. In a special message to Congress, July 31, the President emphasized the need for a sound national program of conservation, improvement, wise use, and development of both land and water resources. He also stated his belief that such a program can be achieved through cooperation among the States, local communities, private citizens, and the Federal Government.

The States have made impressive advances in water pollution control in the past 5 years, but even greater accomplishments are needed if the Nation is to keep pace with the demands of in-

creasing population and industrial production. By far the largest and most serious pollution problem is that of industrial wastes. We do not yet know the precise effects of chemicals in water on human health. We have not yet developed sufficient methods for eliminating these waste products. The production and use of chemicals—new and old—have vastly increased in recent years. The Nation's health authorities are in a position to aid water conservation programs, as well as the control of pollution, by increasing their vigilance over water uses and practices which impair the basic sources of supply and at the same time are potential hazards to public health.

Radiation Problems

We are making progress in the study of radiation problems. Two State health departments, California and New Jersey, in particular are going forward with pilot programs for the control of radiation hazards. Several cooperative programs have been established between the Atomic Energy Commission and the Public Health Service. The Service has recently had a special team which maintained liaison with the Atomic Test Group and the States. A public health team has done a most creditable job this year in monitoring fallout of atomic debris in areas up to 200 miles from the test site.

Home Accident Prevention

I am especially pleased to report progress in yet another "new" public-health program—home accident prevention. The W. K. Kellogg Foundation has awarded grants to eight States for the conduct of statewide demonstrations in this field, on recommendations of the Public Health Service. The Foundation based its extension of support on the success of the 4 local demonstrations initiated 2 years ago. The Service will cooperate with the States in their demonstrations, as we have in the local projects.

The Public Health Service has been fostering this interest in home accident prevention for the past 3 years. We have been able to assemble an enthusiastic and well-qualified team to assist in the design and conduct of demonstrations. The activity is giving our organization and State and local health departments valuable experience in how to develop needed new programs through cooperation with voluntary agencies, private foundations, and universities.

The Public Health Service has been the catalyst and technical consultant. The States and communities participating in the program have recognized a need and want to do something about it. A private foundation has provided the funds for finding out how to do the job. The National Safety Council has been an active participant and a valuable spearhead. The University of Michigan School of Public Health played host to the first National Conference on Home Accident Prevention, sponsored by the council and the Public Health Service, last January. Perhaps this is a design for public health progress in some other areas, and a role that the Service should play in other new and challenging fields in the years ahead.

Highway accidents also maim hundreds of people and take a major toll in lives every day. Voluntary and official agencies are deeply concerned with this problem, yet few official health agencies serve as consultants to the interested groups, or play any role in helping stem the tide of accidents. Technical advice on physical standards for drivers' licenses and on safety engineering is a fertile field for health department cooperation.

Other Environmental Programs

For the first time, the Public Health Service has a small sum allocated in the 1954 appropriations for assisting the States in the certification of interstate milk shippers. During the past 2 years, 395 shippers, representing 30,000 producers in 33 States and the District of Columbia, have been certified by the States. A year from now we expect that approximately 600 shippers, representing 50,000 producers, will be participating in this program.

Work has been completed on the first section of the Poultry Ordinance and Code, which we have been developing with the States and representatives of the poultry and poultry-products industries. The industries are concerned, as we health workers are, that about one-fourth

of all reported outbreaks of "food poisoning" are traced to poultry or poultry products. This fact tends to cause some communities to adopt regulations that serve, in effect, as trade barriers, but not always as adequate protection for the public. A guide to regulations that will both safeguard public health and permit the widest possible distribution of essential foods should be a good springboard for improvement in this area.

Emergency Activities

One of the most important events of the past year was the adoption of a formal agreement by the Public Health Service and the American Red Cross regarding cooperation in time of disaster. A copy of the agreement was forwarded to you with the agenda of this conference and will be a subject of further discussion tomorrow. The Service and the Red Cross recognize that really effective handling of disaster problems can be accomplished only by the State and local people. The State health officers can do more than any other single group to promote such effective handling of disasters in their jurisdictions.

I wish to commend the State and Territorial health officers—each and every one—for the highly successful operation of the emergency gamma globulin distribution program this summer. Between May 15 and October 1, nearly 3,750,000 cc. of gamma globulin for polio were allocated to the States under policies established by the Office of Defense Mobilization, on recommendation of the National Research Council, the Association of State and Territorial Health Officers, and other national groups and individuals. Mass prophylaxis programs, requiring more than 1,600,000 cc. of gamma globulin, were conducted in 23 local communities in the continental United States and in Juneau, Alaska. Approximately 231,000 children were inoculated in the mass programs.

Whatever epidemiologic investigation and scientific appraisal may indicate regarding the effectiveness of gamma globulin in the control of paralytic poliomyelitis, we can feel real gratification that national, State, and local agencies have demonstrated their ability to apply new operating procedures to a traditional public health problem—epidemic control.

In the gamma globulin program, the health officer found himself in a position opposite to his usual role. He had to restrict the use of the material rather than devote his efforts to the promotion of increased application of a public health measure. Despite the difficult, controversial, and potentially unpopular nature of the assignment, no health officer declined to take the responsibility. The Public Health Service's civilian requirements staff functioned effectively in meeting the requirements of the States. There was marked improvement in the reporting procedures.

Antipoliomyelitis Vaccine

Our success in jointly conducting such a "different" nationwide activity has proved again that Federal-State-voluntary cooperation in the health field is strong, reliable, and able to take new responsibilities in stride. The National Foundation for Infantile Paralysis is now asking your cooperation in large-scale testing of a killed-virus antipoliomyelitis vaccine. If studies to date are confirmed in a larger test series, the vaccine may provide an effective immunizing agent which will eliminate large-scale use of gamma globulin against paralytic polio.

Health of Migrant Workers

There are plenty of unresolved problems on our doorstep that need joint action among ourselves and with our colleagues in related fields, such as education, welfare, vocational rehabilitation, law enforcement, agriculture, and others. We need the help of our colleagues especially in solving such problems as health services for migrant workers. Doctor Eliot has discussed this problem with you. She and I are particularly gratified at the interest and constructive thinking demonstrated by a number of State health officers with respect to migrant worker's health.

Hospital Construction

You will recall that, in the approval of projects under the Hospital Survey and Construc-

tion Act, the so-called "split project" technique has been utilized for several years. The technique was designed to permit the approval of large projects, which because of their high cost, would absorb all of a given State's annual allotment, or even exceed it. By spreading the Federal participation over successive fiscal years, it was believed that such projects could be financed without jeopardizing the intended initiation of new construction throughout the country.

At the last session of Congress, there was adverse comment regarding the split project technique. As a result, with the approval of the Secretary, the Public Health Service is issuing a revised split project policy. The effect of the revision will be to limit the approval of such projects to sums not to exceed two-thirds of the equivalent of the Federal appropriation for 1954 in the fiscal year 1955, and to one-third of the same in 1956. In addition, applicants for split projects will hereafter be required to demonstrate their ability to complete a usable facility in the event of reductions in, or failure of, Federal appropriations. Members of the Public Health Service are discussing this new policy with State health and hospital authorities during this meeting.

Personnel Problems

Personnel shortages continue acute in many categories. I regret to say that the shortage of medical public health administrators has grown more critical during the past year. Clinical practice continues to attract most young physicians. I hope that our colleagues in private practice and in the medical associations will increasingly recognize the serious problems which face public health and that they will join us in an aggressive campaign to fill some of the gaps.

Sanitary Engineers

In the fields of sanitary engineering and nursing resources, several interesting projects have been completed. They will be useful in helping meet some of the shortages in these categories. The Public Health Service, for example, has completed a study designed to discover why such a high proportion of the sanitary engineers leave the field for which they were trained in college. It now appears that the majority who leave the field do so immediately after graduation; that is, they fail to enter the field. They lack information about specific job openings. We hope that some way will be found to inform the college seniors of all the jobs available to them in sanitary engineering.

Nursing Aides

The American Hospital Association, the National League for Nursing, and the Public Health Service have prepared a manual of simple nursing procedures for the training of nursing aides. Originally, the Health Resources Advisory Committee of the Office of Defense Mobilization urged the Service to investigate the need for training of these hospital workers. As you know, there are more than 200,000 auxiliary nursing personnel employed in the Nation's hospitals. Most of them have had no preparation. The "learn-as-you-go" training they get is time consuming, as is the constant supervision they require from professional nurses.

The new Handbook for Nursing Aides in Hospitals will be off the press about December 1. At that time, the National League for Nursing will begin a series of regional institutes to teach key nurses in local areas how to use the handbook and to apply the methods of instructing nursing aides which it introduces. I hope that the State health officers and hospital authorities will help extend the training of nursing aides by sending one or more of your nursing consultants to the regional institutes when they are announced in your areas.

The need for health manpower in the United States technical assistance programs overseas also continues to be acute. President Eisenhower has emphasized the importance of these programs, and we call on all of you to rotate some of your staff through tours of duty in international health services.

Last year, we solicited your cooperation in having State health departments sponsor health missions overseas. We realized that there would be many legal and regulatory difficulties to overcome, so we are pleased that three States have taken definite action.

Urges Critical Appraisal

We also wish to express our gratitude, and that of our colleagues overseas, for the splendid work the State health officers, their staffs, and local health authorities have done this year for the thousands of foreign students and visitors in our country. You have contributed immeasurably to our Nation's foreign relations by your warm and continuing interest in these neighbors from the free world who came to study and observe our American health services. I assure you that your understanding and friendship are sincerely appreciated by the men and women whom you have helped.

I am sure that many public health workers in the States and Territories, as well as in the Federal services, are wondering how they can make the admittedly inadequate nationwide expenditure for health purposes do a bigger job and a better job in the face of rising costs, some reductions in financial support, and continuing personnel shortages.

I am sure that we can do a bigger job in spite of some adversity, and I believe that all of us can do a better job. The people in our States and communities must learn to look to their State and local governments and their voluntary agencies for additional support of the services which reach them directly. All of us must learn how to be more efficient in the utilization of available funds. We all need to do a little soul searching. Critical appraisal of our practices and projects may well reveal economies that will make it possible to do a better job in our traditional public health activities, as well as to start some new programs. It will help us eliminate repetition of long-outmoded programs and practices. In so doing, we will be able to launch a successful attack on the major causes of ill health; an attack planned and carried out in an atmosphere of full cooperation and trust by all professional groups, official and voluntary—and without official control and dictation. Such an attack will bring us closer to our great goal—higher levels of health for the American people in their communities.

The Impact of Research And Medical Education On Public Health

By Chester Scott Keefer, M.D.
Department of
Health, Education, and Welfare

The impact of research and education on the public health has been so great in the past 50 years that its full measure cannot be taken in a few minutes. However, I want to reflect a little about it tonight and to take a long look ahead. Permit me to start with your first conference.

Changing Health Problems

When the first conference of State and Territorial health officers and the Public Health Service was called, shortly after the turn of this century, the major health problems in the United States resembled those of many underdeveloped areas of the world today. The average life expectancy at birth was about 49 years. Infant and maternal mortality rates were high; communicable and infectious diseases were prevalent and were frequent causes of death; relatively little was done to prevent pollution of water supplies and food, and many large cities had open sewer systems.

I am told that the discussions in the first conference and in those of many subsequent years were an exchange of knowledge and experience on ways of improving these conditions, since our country—already embarked on the transition from an agricultural to an industrial econ-

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Dr. Keefer is Special Assistant for Health and Medical Affairs to the Secretary of Health, Education, and Welfare. He spoke at the annual banquet of the Association of State and Territorial Health Officers in Washington on November 5, 1953.

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omy—recognized human resources as its most precious national wealth. This shift from an agricultural to an industrial economy carried with it an increasing number of health problems. High priority was given in the early years of public health and preventive medicine to bacteriological research, training and demonstrations in environmental sanitation, and interstate cooperation in combating the spread of infectious diseases.

The contrast between the questions considered in your present conference and in that of some 50 years ago is a dramatic proof of the success of research and education in the health services. Specialists in bacteriology, immunology, epidemiology, sanitary engineering, pediatrics, and obstetrics have greatly extended our knowledge of the causes of infectious diseases. The public health profession has developed techniques that, in conjunction with improved standards of living and advances in the practice of medicine, have almost eradicated the sources of many communicable diseases. Nearly 20 years has been added to life expectancy at birth. This achievement has resulted largely from declines in the death rates for diphtheria, streptococcic diseases, diarrhea and enteritis, tuberculosis, pneumonia, and other infectious diseases which formerly took the lives of many young children.

Primary emphasis in the early attack against infectious diseases was on prevention and detection. These preventive measures served to reduce the number of cases and carriers, thus decreasing the threat of epidemics. These measures for the prevention and detection of infectious diseases must continue with intensity since they are still with us. Overall death rates do not tell the whole story.

Specific Therapy

Specific therapy is a more recent development, stemming from laboratory and clinical research and the development of anti-infective drugs which have further reduced death rates and lessened the hazards of serious and prolonged illness from infections. The use of anti-infective agents has also aided in the prevention of certain diseases.

These successes are at once a source of pride in achievement and a source of confidence in health progress for the future. They are not cause for relaxation of efforts, however, for in many parts of the United States infectious diseases such as tuberculosis and dysentery are still prevalent, and tuberculosis is one of our important chronic diseases. Efforts must be continued on a selective basis to reach the irreducible minimum incidence of morbidity and mortality from infectious diseases in each area and to hold our past gains throughout the Nation. We must also find ways of using and extending our knowledge and experience in an attack against chronic and prolonged illness. The art and science of medicine and public health face the complex problem of preventing, diagnosing, treating, rehabilitating, and minimizing the effects of the chronic conditions that are now leading causes of death and disability.

In the early 1900's heart disease, arteriosclerosis, cancer, diabetes, and mental disorders received scant attention as public health problems, since only about 18 percent of the population survived the hazards of acute infectious diseases to reach age 45. Only an extremely hardy 4 percent lived to celebrate their 65th birthday. These chronic diseases, though found at all ages, strike hardest in the later years of life. The proportion of the aged has now doubled and is still increasing, while well over 25 percent of our population has reached or passed age 45, and half of the deaths in this country occur in the age group of over 65 years.

Research Needs

With the past as prologue in public health, a conference of State and Territorial health officers 50 years hence will unquestionably recount spectacular gains in lessening the prevalence and severity of many of these chronic conditions. Let me outline briefly my views of some urgent needs in an all-out attack against chronic illness.

First, we need precise knowledge of the extent of the chronic disease problem. That knowledge can be gained by local, State, and national surveys to derive estimates of the number of persons suffering from chronic illnesses and impairments. The surveys should be de-

signed to reveal information in terms of geographic areas, age groups, income levels, diagnoses, duration of the condition, and potentialities for rehabilitation and self-support.

Research efforts must also be directed toward analysis of the natural history of chronic diseases, to discover any genetic and constitutional factors that predispose people to hypertension, diabetes, rheumatism, arthritis, ulcers, allergies, and mental and nervous disorders, as well as to assess the influence of diet, housing, working conditions, and physical and emotional stresses that may play a part in the development of these conditions. Research must also extend our knowledge of the aging process to determine what constitutional and environmental factors are associated with a physically and mentally active old age, for infirmity and old age are not synonymous.

Treatment of chronic illness requires more active participation by the patient than is usually necessary in acute illness. Research in the factors that motivate people to act for their health is therefore needed to give us clearer guidance than we now have in our efforts to help the disabled and the aged to make the most of their remaining capacities for self-care and economic independence.

Research and pilot demonstrations must point the way toward more effective means of early case finding, exact diagnosis, referral for medical treatment, followup, prompt rehabilitation, and suitable employment for those who suffer from chronic illness. These measures will not only reduce human suffering and increase our manpower, but will also help to lessen the burden of public aid. Study of the recipients of public assistance, for example, reveals the striking extent to which illness has made it necessary for people to seek public aid. Prompt attention to their chronic ailments might well have forestalled the incapacity for self-support. Of those drawing relief for permanent disability, 40 percent in 30 States reported that 10 years or more had elapsed since the onset of their major impairment. The size of old-age assistance rolls is also an indictment of our failure to preserve or restore and utilize the working capacity of the aged.

A pressing problem of the future is to keep as many aged and incapacitated people as possible out of hospitals and other institutions and to treat them in their own homes. State and Territorial health officers, with their responsibilities for helping and advising States in planning for the construction of hospitals under the Hill-Burton Act, are in a strategic position to influence more appropriate planning for the aged and the chronically ill. Hospitals should be planned in such a way as to extend the availability of outpatient departments, rehabilitation services, and home care arrangements. Prolonged stays in hospitals and custodial institutions, without dynamic programs of rehabilitation, tend to increase the apathy and helplessness of the aged and those incapacitated by chronic disease.

We must, therefore, develop and apply more widely throughout the country better and cheaper methods of caring for the chronically ill and the handicapped, improving their housing conditions, their participation in community activities and their opportunities for independence and self-care. Since many different organizations are needed in this endeavor, we must have effective teamwork among all individuals and agencies in the community concerned with the care of the incapacitated. The difficulty of utilizing all available resources and the necessity for teamwork are revealed by the fact that my home community, the greater Boston area, has 400 separate health agencies. A rural county in the midwest with less than 1,000 people in its largest town had as many as 14 agencies offering some services to the chronically ill. Cooperation, coordination, and systematic referral among these agencies not only prevent duplication of effort and improve efficiency, and hence economy, but also reduce the time lag in providing the types of treatment and rehabilitative services needed by the patient in successive stages of his illness.

Encouraging Developments

This sketch of the focus of some efforts needed to combat chronic illness does not mean that beginnings have not been made in many of the directions I have outlined.

Among the many encouraging developments I might mention is the far-flung network of research being aided by grants from the Public

Health Service, as well as the new approach to integrated laboratory and clinical investigation being started at the Clinical Center in Bethesda. These approaches to solution of the mysteries of chronic illness need no amplification for this audience.

The recent report on schools of public health, published by the Public Health Service, gives heartening evidence of the trend toward greater concern with chronic illness in training public health workers. It also indicates that health departments frequently serve as training and demonstration centers for students of public health. This development provides a close link between research, education, and application of knowledge.

A particularly encouraging approach is described in the report on preventive medicine in medical schools, which forms part two of the October number of the *Journal of Medical Education.* If you have not already read that report, I commend it to your attention. It indicates many ways in which medical schools are attempting to help their students acquire a clearer understanding of patients as people. Many medical schools give students an opportunity, through home care and similar courses, to observe and analyze the social and environmental factors in illness, and to collaborate with nurses, occupational and physical therapists, and medical social workers in caring for patients.

It would be my hope that the health departments would extend their interests to the educational institutions on a wider base. We have much to learn and much to gain from a closer relationship and a better understanding of health problems as they exist in the community.

In addition to their use in training medical students and visiting nurses, home care programs afford means of providing integrated services in the patient's home. Under several programs patients who remain at home receive services from physicians, visiting nurses, physical and occupational therapists, and medical social workers, in accordance with their requirements for treatment, health guidance, rehabilitation, and social services. A health department, particularly in a community that lacks teaching hospitals, can perform outstanding community service by analyzing what components are needed in a good home care program and in helping the community to decide who should administer it. The health department also can help private physicians by providing them with the services of visiting nurses and others needed in the home care of their patients.

Lastly, I call your attention to the forthcoming conference on care of the long-term patient being sponsored by the Commission on Chronic Illness, the Public Health Service, the American Hospital Association, the American Medical Association, the American Public Health Association, and the American Public Welfare Association. Study groups preparing for that conference in March 1954 are assembling facts and standards for services to patients at home and in institutions. Other study groups are concentrating on needs for integration of services and facilities, on research, and on methods of financing services. Physicians, nurses, social workers, public health specialists, medical educators, insurance groups, hospital directors, and representatives of industry and labor are pooling their knowledge and experience in this endeavor. Findings and recommendations of that conference should suggest patterns for desirable relationships among services, facilities, and programs.

Challenge to the Profession

In these developments I foresee an expanding and challenging role for health departments. They can collaborate with medical schools and other institutions training for the health professions by participating in research and in demonstrations of public health practice. They can serve as centers for the administration of medical services to the needy or for advice and help in planning those services. They can give advice and leadership in analyzing a community's needs for institutional facilities and rehabilitation departments and for special groups of personnel, such as visiting nurses, physical and occupational therapists, nutritionists, to provide more services to patients in their homes. With their new responsibilities for licensing nursing homes, they can promote higher standards of safety and care in those facilities, and can act as informational and referral centers to aid in more effective use of such homes.

They can help private physicians obtain the services of various community organizations in the care of patients in their homes so that the most appropriate type of service will be available in progressive stages of the illness.

In one field, maternal and child health, great strides have been made in developing and applying methods for health education, periodic examination, diagnostic services, and referral for treatment and rehabilitation. Given the knowledge and the will, it is within the power of the health professions to do as much for all age groups, including the aged.

The advances in the past have resulted from the application of new knowledge. Advances in the future will likewise result from new knowledge and its transmission through education and public health practice. The shift in emphasis will be to keep well people well and to rehabilitate the handicapped so that as many people as possible will be able to lead useful and productive lives. You ladies and gentlemen of the public health professions can continue to take the leadership in this important field of activity in the future as you have in the past.

Notes on the History Of the Surgeon General's Conference, 1903–53

A Working Federal-State Partnership for the Public's Health

Under the heading, "First annual conference between National and State health authorities," *Public Health Reports* published the following paragraph on page 903 of the June 12, 1903, issue:

"The first annual conference under the law of July 1, 1902, of delegates from the health authorities of the States with the Surgeon-General of the Public Health and Marine-Hospital Service, was held on June 3, 1903, at the New Willard Hotel, Washington, D. C., the conference being called to order by the Surgeon-General at 10 o'clock a. m., and final adjournment being taken at 5:30 o'clock p. m. Twenty-three States were represented by delegates, three others sending letters of regret. . . ."

Section 7 of the Public Health and Marine-Hospital Service Act of 1902 reads:

"That, when, in the opinion of the Surgeon General of the Public Health and Marine Hospital Service of the United States, the interests of the public health would be promoted by a conference of said Service with State or Territorial boards of health, quarantine authorities, or State health officers, the District of Columbia included, he may invite as many of said health and quarantine authorities as he deems necessary or proper to send delegates, not more than one from each State or Territory and the District of Columbia, to said conference: Provided, That an annual conference of the health authorities of all the States and Territories and the District of Columbia shall be called, each of said States and Territories and the District of Columbia to be entitled to one delegate; And provided further, That it shall be the duty of the said Surgeon General to call a conference upon the application of not less than five State or Territorial boards of health, quarantine authorities, or State health officers, each of said States and Territories joining in such request to be represented by one delegate."

The intent of this section was reiterated in

This material was assembled by the Division of State Grants, Bureau of State Services of the Public Health Service.

Section 312 of the Public Health Service Act of 1944 (Public Law 410):

> "A conference of the health authorities of the several States shall be called annually by the Surgeon General. Whenever in his opinion the interests of the public health would be promoted by a conference, the Surgeon General may invite as many of such health authorities to confer as he deems necessary or proper. Upon the application of health authorities of five or more States it shall be the duty of the Surgeon General to call a conference of all State and Territorial health authorities joining in the request. Each State represented at any conference shall be entitled to a single vote."

Surgeon General Wyman presided at the first annual conference and in his opening address, published in "Transactions of the First Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service," said:

> "What may be the result of these annual conferences time must determine, but certainly we may consider the present, the first annual conference under the law, as a most noteworthy event. For the first time in the history of the United States there has been placed within its statutes, by the act of Congress referred to, a provision looking to harmonious and cooperative efforts in public-health matters between the National Government and the State governments.
>
> "This status has long been desired, but difficult of achievement by reason of our republican form of government. It has been difficult for the National Government to extend its influence into State health matters without appearing to infringe upon the States' authority, and it has been difficult for the States, individually or collectively, to seek aid from the Government without appearing to surrender authority reserved to them by the national Constitution. In the meantime, however, the Marine-Hospital Service, now bearing the title of the Public Health and Marine-Hospital Service of the United States, has become so developed and strengthened, and the State health organization have been so perfected, that a sentiment of respect, one for the other, has been established, finding its expression in this law of 1902, and, in particular, section 7, above referred to.
>
> "To my mind the outlook is bright. The great problems to be solved in sanitary affairs, the great work to be done in the suppression, and even elimination, of disease, and the cultivation of health and strength, so that physically, as well as in other respects, the United States may take a leading position among the nations, are propositions which should not be considered impossible of solution, and a proper development under the terms of this law will be an important step in this solution.
>
> "One of the most important features of this assemblage is its official character. All of us are familiar with conventions of similar purpose, productive of much useful information but entirely lacking in official significance. Here, however, are assembled the legalized health authorities of the States, representing the practical administrative experience as well as the theoretical and scientific knowledge required in the consideration of public-health affairs.
>
> "Many of you have devoted the best years of a long professional life to the consideration of the subjects which will come before us, having acquired, in individual instances and on special subjects, unusual knowledge and wisdom.
>
> "Combined effort appears to be a distinguishing feature of this new twentieth century. This is seen in nearly all forms of civic and commercial life and even scientific and professional effort. It would seem that when the history of the twentieth century is written there will be lacking those great and single characters looming away above the average, leading, directing, or dictating; instead there will be an elevation of the average, the best individual effort will, neither in purpose nor effect, aggrandize the individual, but will be exerted in connection with other efforts of

like nature for the establishment of a parity of well-being among all. This, I take it, will be the keynote of our action, bearing constantly in mind the actual results to be attained and being determined to attain them."

The Surgeon General went on to say: "While the present is the first annual conference, it is not the first conference called under the law. Last January, upon the request of 22 States, a so-called plague conference was called to consider the situation in San Francisco. The proceedings of that conference in detail have been transmitted to each of you. The effect of it was undoubtedly very great in bringing about the present satisfactory status in San Francisco. The object of that conference was specific, but, as you will note, the law providing for the annual conference gives no details. We must assume, therefore, that the intent of the law is that we shall get together, and we are to decide ourselves as to the matters to be considered."

Dr. Wyman proposed that this first conference be organized into committees dealing with: scientific research and sanitation, prevention and spread of epidemic diseases, morbidity and mortality statistics, State legislation, education,.and special committees on specific diseases such as cholera, yellow fever, plague, smallpox, tuberculosis, leprosy, and typhoid.

Conferences have been held annually since 1903 with the exception of the year 1946 during which two conferences were held. Early the conference became known as a "working conference" rather than a meeting in which there were presentations of many scientific papers. By 1920, some State health officers were bringing their State sanitary engineers to the meeting in order that they could enter into the discussions of the many sanitation problems which came up at the conference. This pattern of bringing staff members with them is currently followed by several State and Territorial health officers who feel that the benefits to be derived from committee discussions justify the attendance of certain members of their staff at the Surgeon General's conference.

In 1935, the State health authorities also met with officials of the Children's Bureau. In anticipation of the enactment of the Social Security Bill before the end of the calendar year, the entire time of the conference was given to discussion of the proposed program to be carried out under the provisions of the bill. Recommendations were presented by the conference to the Surgeon General with respect to the proposed allotment of funds to the States and the regulations governing submission of plans and payment of allotments.

In 1937, committee work was accomplished by joint committees of the Surgeon General's conference with the State and Provincial health officers conference.

In 1941, the need for more time for committee work was expressed. Also, it was suggested that an attempt be made to formulate ahead of time the items for discussion.

In 1942, the State and Territorial health officers organized as an association, and soon following this organization the conference committees were dispensed with and the committee work was taken over by committees of the association.

Currently items are proposed both by State and Federal constituents in the form of recommendations to be adopted by the State and Territorial health officers in conference assembled. Items proposed are referred by the executive committee of the Association of State and Territorial Health Officers to the appropriate standing committees for study and discussion at the time of the conference to determine if the recommendations should be proposed to the entire conference for adoption.

The National Mental Health Act of 1946 amended Section 312 of the Public Health Service Act of 1944 to read:

"A conference of the health authorities of the several States shall be called annually by the Surgeon General. Whenever in his opinion the interests of the public health would be promoted by a conference, the Surgeon General may invite as many of such health authorities to confer as he deems necessary or proper. Upon the application of health authorities of five or more States it shall be the duty of the Surgeon General to call a conference of all State and Territorial health authorities joining in the request. Each State repre-

sented at any conference shall be entitled to a single vote. Whenever at any such conference matters relating to mental health are to be discussed, the mental health authorities of the respective States shall be invited to attend."

The Hospital Survey and Construction Act of 1946 provided the authority for expanding further the attendance at these annual conferences by the addition of State hospital officials. Section 634 of this act is as follows:

"Whenever in his opinion the purposes of this title would be promoted by a conference, the Surgeon General may invite representatives of as many State agencies, designated in accordance with Section 612 (a) (1) or Section 623 (a) (1), to confer as he deems necessary or proper. Upon the application of five or more of such State agencies, it shall be the duty of the Surgeon General to call a conference of representatives of all State agencies joining in the request. A conference of the representatives of all such State agencies shall be called annually by the Surgeon General."

In 1947, the Association of State and Territorial Health Officers amended its constitution to include in its membership heads of or executive officers of any agencies other than the State departments of health which are legally designated as the agencies to administer plans aided by Federal funds allocated to their respective States for mental health and surveying or constructing hospitals.

A definite pattern of the annual conference has been established in order that, with as little confusion as possible, the week of the conference serve as an annual meeting of the Association of State and Territorial Health Officers, meeting of the Surgeon General with mental health authorities and representatives of State hospital survey and construction agencies, meeting of the Chief of the Children's Bureau with the above named groups and other State and Territorial health officers, as well as a conference of the Surgeon General with State and Territorial health officers. The conferences, since 1946, have been held at the end of the year in order to avoid conflict with sessions of the State and Territorial legislatures.

New Commissioner of Social Security

John William Tramburg, appointed Commissioner of Social Security, Department of Health, Education, and Welfare, by the President on November 10, 1953, was sworn in on November 24. From March 1950 Mr. Tramburg was director of the Wisconsin Department of Public Welfare. He was director of the District of Columbia Department of Public Welfare from May 1948 to February 1950.

A graduate of State Teachers College, White Water, Wis., Mr. Tramburg also attended the University of Chicago School of Social Service Administration and the Columbus University Law School. During the war he was on duty with the Navy. He was assistant superintendent of the Industrial Home School, Washington, D. C., from 1945 until appointed director of the District of Columbia Department of Public Welfare.

Federal-State Relations and Grants-in-Aid

By OVETA CULP HOBBY

THE VERY GROWTH of government has made it more difficult to keep in touch with it; to keep it in touch with the people. Along with growth has come a shift of responsibility, from local to State, and from State to national government. Again it is hard to realize that only 40 years ago local governments—cities, counties, and school districts—collected and spent about two-thirds of all taxes in this country. The State and national governments shared the remainder. That meant that, in the main, government was close to the people. In local government people know and understand more readily what goes on. They know their officials personally. If they don't like what is done, they know whom to hold responsible.

Today the situation is quite different. The Federal Government now collects about three-fourths of all taxes, and States and local governments share the remainder. Local governments now get less than one-eighth instead of the former two-thirds of the Nation's tax dollar. The expansion of government activities has been at the State and national level. Government has tended to move away from the people.

Then, too, with the general increase in governmental activity the dividing line between functions of local and State and national government has become blurred. The States and the Federal Government now engage in many activities which were formerly left to local government, or to private interests. We have only to look at the various programs administered by our new Federal Department of Health, Education, and Welfare to see what has happened. Practically all of our expenditures in this Department are for purposes, for functions which are entirely new to the Federal Government within the last 20 years. In many instances these functions are new also to State and local governments. And instead of any given function being carried on by some 1 level of government, all 3 levels—local, State, and national—are frequently concerned with the same functions.

The Secretary of Health, Education, and Welfare discussed intergovernmental relations in the Federal system before the Pasadena (Calif.) Chamber of Commerce on August 27, 1953. The excerpt here deals primarily with concepts of grants-in-aid.

Partners, Not Rivals

Federal participation in all these fields is largely financial, in the form of grants-in-aid to the States. The actual administration is in the hands of State and local authorities. In public assistance, for example—which is by far the largest and the most expensive of our many grant programs—99.6 percent of the money appropriated by Congress is passed on to the States, and States frequently pass it on to the localities. But in making the grants Congress imposes certain conditions. It requires certain standards to be observed in the use of the money. This means that the national agency must interest itself, to some extent, in State and local administration. That gives rise to the charge of Federal interference or Federal dictation which we hear so frequently in con-

nection with the grant programs. This is the crux of the problem of Federal-State relations.

To me this appears to be one of the most crucial problems of our governmental system today. You will note that I suggested as my topic, "The Federal-State Partnership." That was a quite deliberate choice. I think too often we regard the Federal Government and the States as rivals, each trying to extend its jurisdiction and each trying to get a larger share of the citizen's limited tax dollars. That is not a sound conception of intergovernmental relations in a Federal system. It may be that some of our difficulties in this field derive in part from such a philosophy. I prefer to think of the States and the Federal Government as partners, each doing its share in the overall business of government. I am sure government can serve the people better if we take that point of view.

I'm glad to see this question of Federal-State relations, of grants-in-aid, getting so much public attention. I understand your national organization recently sponsored a conference on the subject. The Governors' Conference at Seattle devoted a half-day to it. And Congress, at the President's request, has established a Commission on Intergovernmental Relations to study the whole subject and make recommendations for action. With this study pending I shall certainly not attempt, today, to produce all the answers. I don't know the answers. But I do know many of the problems, and I should like to think with you about how this idea of a Federal-State partnership can be applied to some of these problems.

For purposes of discussion I shall talk in terms of programs within my own Department. There are other grant programs, of course, and I suppose there are problems of Federal-State relations in these programs, too. But the bulk of Federal grants are in the fields of health and welfare, and the principles with which I shall deal are applicable, I am sure, to grants-in-aid anywhere.

Allocations of Functions

In the first place I think we must recognize that whatever is done about grants-in-aid, the activities now supported in part by grants will continue. While they may have been stimulated, in the first instance, by grants, they have become so much an established part of State and local government services that they are not likely to be much decreased. In this discussion, therefore, we are not concerned with whether or not a given function should be dropped or continued, but rather with who shall perform certain functions, and how they shall be financed.

There are two different ways in which we may approach this question. We may try to separate the functions, allocating some to the Federal Government and some to the States—and perhaps some others to the local communities. Each jurisdiction would presumably be fully responsible for the function in question. This allocation of functions is the usual suggestion. It has much to recommend it. It is simple; responsibility and authority are clear and undivided. There can be no overlapping, or duplication, or conflict. To the extent that programs can be adequately maintained in this way, without undue burden in some parts of the country, it seems to me this would be a desirable solution for at least some of the problems.

Even so, it is not always easy to determine which functions should be performed by the States and which by the National Government. Both are interested in the welfare of the people. But ours is a Federal system and the Federal Government is now so burdened with international and strictly national matters that wherever possible what might be called the domestic functions should, I believe, be left to the States. Of course there is always the temptation to assume that the larger jurisdiction is necessarily wiser or stronger and can perform a given function better than the smaller jurisdiction. This is a temptation we must resist. The strength of our Nation lies not in building up a huge central government but in maintaining strong and vital State governments. As President Eisenhower said to the Governors at Seattle, unless we find ways to strengthen and vitalize State governments, our system of government as we have known it will cease to exist. I believe, therefore, that insofar as possible most of these activities with which we are concerned should be decentralized to the States.

Here we run into some serious difficulties. These activities are expensive. In many States welfare costs are second only to the cost of education in State budgets. For the country as a whole, the Federal Government, through grants, bears a little over half of this cost. If these grants were to be discontinued and the States attempted to carry on their programs, the increased burden on State treasuries would be enormous. And unfortunately the largest relative burden would fall on the States with low incomes. These are the States where the Federal Government now contributes 60 to 70 percent, or even more, of the cost of some of these programs. And, in the main, these States are already taxing their resources very heavily, in some instances 20 to 25 percent more than the national average. It is difficult to see where they would find the revenues to carry on these services even at a minimum level.

Exchanging Taxes for Grants

To help meet this situation it is generally proposed that certain taxes now collected by the Federal Government be discontinued so that the States can use these sources of revenue. I might point out, in passing, that such an exchange of taxes for grants would not relieve the Federal budget in any way. Also, it is by no means as simple and complete a solution of the problem as it appears on the surface. If the Federal Government discontinues a given tax it must apply that policy nationwide. It cannot collect a given tax in one State and not in another. Unfortunately there is no assurance that any tax or group of taxes which might be selected to be turned over to the States will provide revenues, in individual States, which will be in any way related to the need for funds to replace the grants which are to be discontinued.

Let me illustrate what I mean. It is commonly suggested that the taxes on amusement, and on local telephone service, and the gift and death taxes would be suitable for State rather than Federal collection. This seems reasonable. These particular taxes would be as evenly distributed among the States as any that could be found. The total yield of those three taxes is about equal to the total grants made by our Department. But the distribution among the States of the grants now being made, and of the potential tax yields, would be quite different. In general, the taxes would provide revenue largely in the States with high per capita incomes, while grants go somewhat more to States with low incomes. The 29 States with incomes below the national average get about 52 percent of the grants made by our Department, but they would get only 25 percent of these taxes. In individual States the difference is even more striking. Several States with the highest per capita incomes would derive 3, and even 4 times as much from these taxes as they now get in grants; while some States with much lower incomes would collect in taxes only one-fourth as much as they are getting in grants.

Needs of the Low Income States

This points up the basic problem which must be faced. The needs which are to be met—aid to the aged, blind, the disabled, and assistance to mothers and dependent children, and so forth—are greatest in the States where incomes are relatively low. In these States, resources to meet the needs are limited. In States where incomes are high and resources relatively more adequate, the need to be met is much less. And any attempt to give the States added tax revenues instead of grants will give relatively more aid to those States with large resources, and relatively less to those with small resources.

In such a situation a complete decentralization of these functions seems impracticable. We have, here, the basic reason for grants-in-aid. The grant is another form of Federal-State partnership. Instead of each partner assuming complete responsibility for certain functions, each contributes to a given function that which he can do best. Unquestionably these programs can be administered best by State and local authorities. That responsibility should be theirs. It is equally clear that many States cannot raise the necessary revenues to finance the programs without unconscionable tax burdens on their limited resources. The grant is a device through which the national government and the States cooperate; the Federal Government using its overall taxing authority to provide funds, and granting these funds to the individual States so they can meet

the needs of their people without too heavy a tax burden in individual States.

I realize that this grant-in-aid procedure is not without its dangers. If there are too many conditions attached, if there is too much detailed supervision by the granting agency, a system of grants may result in expensive and confused administration and in centralized control. It has sometimes worked that way. But this is not inevitable. There is no need to throw out the baby with the bath. I am convinced that the necessary conditions can be made simple and clear, so these difficulties need not arise. Supervision and control, too, can then be at a minimum and consist, in the main, of consultation and help to the States in improving their programs. So constructed and so administered a system of grants-in-aid will not weaken State government or centralize controls. On the contrary, by enabling States to meet the increasing demands made upon them, such grants will constitute a real source of strength for State governments.

To summarize then, this business of government has become so huge, and so complex that the Federal Government and the States must share responsibility; they must act as partners in serving the people. In the main, every function should be the responsibility of one level of government, to avoid overlapping and confusion. The Federal Government has such heavy responsibilities in connection with international and purely national matters that the domestic functions should be left to States insofar as possible. But the industrial and financial structure of our country is such that much of the tax-paying ability is located in a limited number of States, while other States lack resources to carry on alone some of the essential services. And the Nation as a whole does have a residual responsibility, even for some of these domestic functions, in situations where individual States are unable to provide them. In such circumstances a system of grants-in-aid, properly organized and administered, can assist States in meeting their obligations and prevent the transfer of these functions to the central government.

Sixth Annual Venereal Disease Symposium

The Sixth Annual Symposium on Recent Advances in the Study of Venereal Diseases will be held at the Department of Health, Education, and Welfare auditorium in Washington, D. C., on April 29–30, 1954. All interested physicians and allied workers are invited to attend and to participate in the program. Requests for a place on the program, together with titles and tentative abstracts of papers should be forwarded to Dr. James K. Shafer, chief, Division of Venereal Disease, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C.

Progress in the Development of Hospital Services In the Latin American Republics

The key position of the hospital in the scheme of medical care and public health in the Latin American countries here is traced historically and its main characteristics are described. "Hospital services," the evaluators felt, "must be reviewed critically with regard to the long-range possibilities of greater emphasis upon support of the preventable disease services."

HOSPITAL SERVICE is but one of the elements in the broad structure of health services, although in dollar expenditures for health it receives much greater emphasis than other elements in most of the Latin American countries. Hospital service must be reviewed critically with regard to the long-range possibilities of greater emphasis upon support of the preventable disease services. High morbidity and mortality rates in many of the Latin American countries for diseases such as tuberculosis, the dysenteries, and malaria have a profound influence on the demand for hospital beds and on the general social and economic welfare of the countries.

This is the twelfth in a series of excerpts from the report of the Public Health Service's evaluation of a decade of operation of the bilateral health programs undertaken by the Institute of Inter-American Affairs in cooperation with the governments of the Latin American Republics. Background information on the evaluation survey and on the origin and structure of these programs can be found in the September 1953 issue of Public Health Reports, beginning on page 829.

Historically, Latin America has had two main economic groups, the very rich and the very poor. A large proportion of the population can be considered medically indigent with regard to ability to meet medical care costs on an individual basis. This situation may have had an influence on the early adoption of social legislation, including provision for health insurance, in most of the Latin American countries. It has undoubtedly led to a greater degree of reliance on national funds for the support of hospital services than is customary in the United States. However, a growing middle class appears to be having a beneficial effect upon the development of hospital services.

Financial Support

The church played a dominant role in the provision of hospital service during the early history of the Latin American countries, utilizing funds derived largely from land grants and other property holdings. With the trend toward separation of church and state, the property holdings were turned over to quasi-independent boards of charity, the *Junta de Beneficencia*, made up of prominent, wealthy men and women. With funds from their prop-

erty holdings supplemented by government tax funds and, in some instances, returns from lotteries, these boards operate several hundred hospitals in Latin America. Increased government support to meet the public demand for hospital care has led to increased government supervision and control of the *Beneficencia* hospitals.

The rapid growth in recent years of hospital insurance programs, including both voluntary and compulsory arrangements, has brought about greater personal responsibility for meeting the costs of hospital care. It has also resulted in the construction and operation of hospitals by a new interest, the insurance fund. One of the most modern and well-operated hospitals seen in Latin America—at Lima, Peru—was constructed and operated by the workers' insurance fund (*Segura Obrera*). This fund also operates 12 other hospitals in Peru, and plans are under way for a hospital expansion program which will approximately double this number.

In 1950, the largest Chilean compulsory health insurance fund for workers hospitalized 100,000 of its beneficiaries in the *Beneficencia* hospitals for a total of 2,000,000 patient-days. In Uruguay, although hospital and medical insurance are not compulsory, almost 400,000 persons in Montevideo, approximately 50 percent of the city's population, have some form of coverage in voluntary health insurance societies. These societies either operate their own hospitals or pay for care in hospitals operated by the Ministry of Health or in private institutions.

The maldistribution and frequent shortage of hospital facilities and personnel often makes it impossible for insurance funds to provide the scope and quality of service promised under the social security programs. Social security progress in the field of hospital care is nevertheless considered highly significant, resulting not only in the introduction of numerous third-party arrangements, but also in a greater personal responsibility for hospital care than existed in previous decades.

Retarding Factors

Certain geographic factors have undoubtedly led to delays in providing adequate modern hospital services in Latin America. The large areas of sparse population in many countries have made difficult the provision of hospital services readily available to all the people. Tropical and subtropical climates have tended to slow down the tempo of life.

Certain geographic factors have tended also to further certain diseases, resulting in an excessive hospital patient load in most areas. Economic conditions hamper the proper use of known specific drugs and procedures which would shorten patient stay. The problem is further complicated by the tendency of the people to be more receptive to remedial care than to preventive measures.

Progress in many areas has undoubtedly been retarded by the lack of organized and adequately staffed public health units and by the centralization of responsibility for hospital services, as well as many other health services, at the national level. There is a lack, as well as maldistribution, of such personnel as hospital administrators, physicians (particularly specialists), and nurses. Moreover, adequate arrangements have not been provided in most countries for employing hospital staff on a full-time basis.

In general, there is a shortage of funds for required new construction or replacement of hospital facilities or for the use of up-to-date procedures in hospital operation.

Elements of the Problem

The problem of providing modern hospital services in Latin America involves:

Provision for economic support of required services.

Positive measures in the field of public health, particularly in the control of intestinal diseases and tuberculosis, to decrease the demand for hospital service.

Training of medical, nursing, administrative, and auxiliary personnel.

Development of a broad health program which will bring about a unification of the many health and medical services under a comprehensive planning and administrative unit operating at local as well as national levels of government.

The organizational philosophies and struc-

tures of health services in the United States may not necessarily be adaptable to the problems in Latin America. Any cooperative effort should recognize these local factors and allow for the establishment of new and carefully studied experiments.

Progress and Deficiencies

The growth of hospital service in Latin America, as in other parts of the world, has usually followed the pace of economic and social progress. The most modern hospitals rendering the highest quality service are usually in the more highly developed countries and in the capitals and other large urban centers. In Uruguay, for example, there is a ratio of 5.92 hospital beds of all types per 1,000 population in rural areas and a ratio of 12.67 beds of all types per 1,000 population in Montevideo. In Brazil, available figures show a ratio of only 1.8 hospital beds of all types per 1,000 population. The Federal District of Rio de Janeiro has approximately 5.7 beds per 1,000 population, and the rural State of Goyaz has only 0.6 beds per 1,000 population.

Government support for hospital services is greater in the underdeveloped and economically depressed countries and in the backward areas of the more progressive and economically secure countries than in the more highly developed countries or areas. For example, while the large majority of hospitals in Ecuador, Paraguay, and El Salvador are maintained by the government, the largest proportion of private support is in the capital cities of these countries. In general, hospitals receiving financial support from philanthropy and contributions from patients, through insurance or otherwise, are better than those supported primarily by the national government.

National hospital organizations like the American Hospital Association are scarce in Latin America. This lack has been a major handicap in attempts to establish an effective inter-American hospital association.

Physical Facilities

From the standpoint of the number of hospital beds, the physical facilities for hospital care in most Latin American countries are far short of modern accepted standards. The need for additional hospital facilities is particularly acute in rural areas, especially beds for patients with tuberculosis, chronic illness, and mental illness.

Throughout Latin America, some excellent, well-designed, modern hospitals were seen. The majority of the hospital plants, however, are old and obsolete. They lack adequate central services required for modern diagnosis and therapy, and, in many instances, they are so large that administration is difficult and the potentialities of a smaller hospital for personalized individual patient attention are lost.

Poor design in some of the hospitals built during recent years and delays in completion were noted in several countries. Because of the policy determining appropriations, 14 hospitals in Chile, for example, were in various stages of construction for periods far in excess of that usually required for the construction and equipment of an institution.

Importance of Planning

Hospital planning is important at the national, regional, and community levels. It is important in relation to social, cultural, and economic factors and in relation to the other health programs of the country. It is essential in relation to the location, design, staffing, administration, and financial support of the individual hospital. Adequate hospital planning implies arrangements both for effective distribution of medical skills and for training programs and personnel practices essential to efficient and effective hospital service.

Several countries, notably Chile, have developed national hospital planning programs, and other countries have recognized the need for such programs and appear interested. In Chile, planning has included an inventory of available hospital facilities and needs for the construction of new hospitals and the replacement, modernization, or expansion of old ones. Legislation has been proposed for the fusion of preventive and curative services. It includes provision for the coordination of all agencies concerned with hospital service at the national level and, through the development of a regional

approach, a coordination of hospital administration activities and financial support embracing the numerous interests, governmental and voluntary, at national, regional, and local levels.

The development of hospital insurance programs has accentuated the importance on national hospital planning. Such planning is essential to secure the beneficial effects of joint private and governmental interest and support.

Administration and Operation

Two fundamentals entered into the evaluation of the administration and operation: Good administration of the individual hospital is essential for even the best hospital plant to provide good or economical service. Sound administrative policy and direction of the national hospital system is necessary for this system to make its maximum contribution.

Although the national administration of hospital services is usually a responsibility of the ministry of health, supervision is seldom provided by the director of a country's health service. Hospital administration at the national level frequently presents the characteristics of bureaucratic governmental organization. The financial support of the hospital system often appears to be subject to factors inherent in the national economy, and budgets for personnel, food supplies, drugs, equipment, plant maintenance, and plant expansion, to be limited. Budgets for individual hospitals have sometimes been approved without respect to scope, quality, or volume of service, and with little or no supervision over the actual hospital expenditures. The uncertainty of annual income from the *Beneficencia* properties frequently has led to limitation of service, for example, the withholding of expensive drugs or the actual closing down of a service.

Throughout Latin America, particularly in the larger cities, there were evidences of the value of assigning hospital administration to competent individuals. The administration of such hospitals as the Segura Obrera Hospital and the Tuberculosis Sanatorium at Lima, Peru, and the St. Vincent de Paul University Teaching Hospital at Santiago, Chile, would compare favorably with that of any North American institution.

Modern hospital administration, however, is far from the rule. Administration is often in the hands of a practicing physician who spends a few hours or less at the hospital each day. It usually follows no orderly pattern and employs few of the recognized and accepted procedures. With improved hospital administration and management, more and better patient care could be given for the money now being spent.

Staffing and Services

The maldistribution of physicians between urban and rural areas which exists in North America and other sections of the world was also noted in Latin America. In practically all countries, the large cities are in a very favorable position, whereas the smaller urban and rural areas are badly in need of additional physicians. The development of specialties is still primarily confined to the large cities.

There are examples of excellent medical staff organization. At the San Salvador Hospital in Santiago, for instance, undergraduate, intern, and residency training programs are well supervised, and clinical research is receiving considerable attention. However, in most hospitals, particularly those in the more remote areas, the staff is not well organized. Frequently, each service has its own operating suite and outpatient department. Generally, physicians are employed in large numbers, almost always on a part-time basis. This situation is aggravated by inadequate hospital budgets which prevent the use of many needed diagnostic and treatment procedures.

Many physicians hold several part-time salaried jobs, usually with the government. It is estimated that in Chile, 95 percent of the physicians in private practice also hold one or more government part-time positions. Many countries, particularly Chile, are recognizing the desirability of full-time salaried positions at income levels commensurate with a professional livelihood.

Professional nursing is just beginning to be recognized to any great degree in Latin America. Many large hospitals are operated without a single graduate nurse. Bedside and other nursing duties are often carried out by individuals with little or no formal training.

Outpatient Services

Although good outpatient clinic services were observed in several of the Latin American countries, primarily in the large cities, ambulatory outpatient services are not usually well organized. Clinics are usually crowded and lacking in sufficient medical and nursing staff. There is a tendency to look upon them as emergency, charitable services, with little appreciation of or connection with the home or other health and social agencies in the community. However, many of the health insurance programs and medical teaching hospitals include good dispensary service for medical care beneficiaries and in some areas provide medical care in the home. Ambulatory outpatient services normally expected of a community hospital are often provided at the health centers in Latin America.

Laboratory Services

Although a number of hospitals, particularly medical teaching institutions, such as the San Salvador Hospital in Santiago, the Segura Obrera Hospital at Lima, and several other large hospitals, provide laboratory examinations for all patients entering the hospital and a wide range of indicated clinical laboratory and pathology services, many hospitals were observed where such services are limited both in scope and volume. Laboratory work is often performed by persons with little basic education or formal training and often lack adequate medical supervision.

Patient Care

To understand hospital care of the patient in Latin America, some of the local philosophies and beliefs, as well as the development of the whole society, must be appreciated.

In the more underdeveloped countries, the majority of the patients on the wards of the hospitals are free-care patients. Patients in the higher income brackets tend to go to the United States for treatment for serious illness, or to be cared for in private hospitals, usually operated by physicians, occasionally by other groups of Latin Americans.

In the more progressive countries with greater monetary resources and an increasing middle-class population, different situations were encountered in the capitals and other large cities. For example, in Lima, Peru, in addition to the workers who budget for their hospital care under the health insurance fund, approximately 10 percent of the patients of the *Beneficencia* hospitals pay for their care. There is also a large number of private institutions for pay patients. In the 1,100-bed university teaching hospital at Santiago, about one-third of the patients pay for their care through various insurance funds; one-third pay individually, in part or in full; and the remaining one-third are free-care patients. Under competent administration, the percentage of patients paying in part or in full greatly increased during a 2-year period following the institution of a social service interview. In contrast to this situation, the 500-bed regional general hospital at Talca, Chile, reported that only 17 percent of the hospital income is secured from the workers' insurance fund, 3 percent from private patients, and 10 percent from part-pay patients. The remaining 70 percent is in the form of charity or tax-supported revenue of the *Beneficencia* or the government.

Patient Costs

It was not possible, because of time limitations and the unavailability of statistics, to make a comparison of hospital costs per patient-day by country. However, had this been done, the range probably would have been great because of variations in the number of personnel employed, the amount of nursing service provided, the quality of food, drugs, and supplies, and the existing inflationary situations in several of the countries. Moreover, a high per diem cost which reflects an excellent quality of care is in itself not undesirable.

The cost per patient-day at the university teaching hospital in Santiago was approximately $3.50. In Brazil, the hospital division of the Ministry of Health was inclined to grade the efficiency of the hospital by the cost per patient-day. In general, the hospitals operated by the social security program were considered of good quality. The cost per patient-day was about $9 in these hospitals, whereas some general hospitals had patient-day costs of about $3. It appears that when a patient, either through

insurance or otherwise, is providing a contribution toward his hospital care, the care tends to be of better quality.

Grouping

In most Latin American countries, there is a tendency to develop specialty hospitals for infectious diseases, tuberculosis, and mental illness, and for the care of children. In outlying rural and small urban hospitals, however, patients in all categories are sometimes in the same hospital. In one locality, patients with tuberculosis, typhoid fever, hypertension, and alcoholic psychoses were seen on the same ward, without segregation. Wards sometimes contain as many as 50 or 60 beds.

Except in the larger, newer hospitals, nurseries for the newborn are not the rule. Babies are usually cared for in the mothers' beds or in bassinets at the bedside. At one hospital visited, half of the obstetrical beds had 2 mothers and 2 babies in each. Outside the major cities, little attention is paid to special dietary measures or techniques.

Drugs

In general, the newer drugs were available in the hospitals visited, both in urban and rural areas. However, although there was no evidence of withholding necessary drugs in the hospitals in the larger cities, in some hospitals visited the patients were not getting needed drugs unless they were able to pay for them. The superintendent of one of the latter hospitals recognized the shortsightedness of this policy by citing this experience. In cases of typhoid and typhus, the average hospital stay when chloromycetin was used was 4 to 5 days with no mortality; without chloromycetin the average stay was 4 weeks with a 7-percent mortality.

The change from the old to the new was observed on visits to the pharmacies of individual hospitals. Although the empirical drugs were still on the shelves in their fancy jars, the more specific and effective drugs commonly in use today were in stock.

Duration of Stay

Comparison of the duration of patient stay in Latin American hospitals with North American standards was frequently difficult because of the inclusion of tuberculosis patients in the general hospitals. Even in the large medical centers in Latin America, the average stay is considerably longer than the average in the United States. However, the introduction of trained hospital administrators seems to have had a beneficial effect on patient turnover. The patient stay at the university teaching hospital in Santiago was lowered from 26 days in 1946 to 16 days in 1951, for example.

There was considerable evidence in most of the hospitals visited that more effective use of hospital beds could be made with improvement in administrative, medical, nursing, and therapeutic techniques.

Hospital Records

Hospital records are necessary for a proper evaluation of the individual patient's care and progress. They are necessary as basic information for good hospital administration and, from the standpoint of national supervision, they are indispensable for an equitable distribution of insurance or tax funds.

Good hospital records were seen at many of the larger institutions, but, in general, considerable improvement is needed. The need for accurate patient records and uniform hospital statistics assumes greater importance as third-party interests, in the form of health insurance funds or other sources of revenue, enter the field of hospital care. In one country where practically all of the hospitals are supported by the ministry of health, a hospital division was being organized in the ministry to handle distribution of national tax funds among the individual hospitals, as well as to perform other administrative functions.

Special Disease Problems

Tuberculosis, one of the major causes of death in most of the countries, presents an acute problem with regard to control measures, including hospital care. With the exception of Uruguay, all of the countries visited have an extreme shortage of tuberculosis hospital beds. The gravity of this situation is indicated by reported tuberculosis mortality rates. For ex-

ample, in Chile a rate of 450 deaths per 100,000 population a year has been reported, although at the time of the survey the general agreement amoung public health authorities was that the rate was about 250 per 100,000 population.

Leprosy also presents special hospital facility and administrative problems in many Latin American countries, particularly in the more tropical regions.

Although the tendency in most Latin American countries has been to establish isolation or infectious disease hospitals, particularly in the larger cities, there was found an intermingling of these patients on the wards of the general hospitals, particularly in the rural and small urban areas. The high incidence of infectious diseases in many of the countries points to the need for strengthening local public health and sanitation programs in both rural and urban areas. The new, excellently operated and staffed infectious disease hospital in Santiago, Chile, has had a very large number of typhoid patients. The high caseload of venereal diseases at the San Juan de Dios Hospital at Quito, Ecuador, indicates that possible savings in hospital costs might be realized if adequate antibiotic therapy and other control measures were practiced by the venereal disease clinic in that city. A visit to the clinic revealed that only about 10 percent of the venereal disease cases treated received penicillin therapy.

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The national and local budgets for hospital service in all of the Latin American countries represent the major portion of the total health budget. Frenquently, expenditures for hospital service are many times the amount expended for organized public health preventive services. The demand for hospital and medical care is large, loud, and continuous. Unless this demand is met with a judicious appraisal of the interrelationships of the two services, the progress of badly needed preventive public health work may be impeded and the ultimate health and economy of the people adversely affected.

"To fight against . . . misunderstanding"

Before the National Council of Negro Women on November 12, 1953, Undersecretary of Health, Education, and Welfare Nelson A. Rockefeller spoke of the importance of giving visitors from abroad an opportunity to "see how we live in America." He said:

May I close by reading you the words of one visitor to our country? Although his English is not perfect, his message is a moving tribute to the power of face-to-face contact to foster good will and understanding.

"And now two years have passed. The wonderful trip through USA has been finished. I cannot say I built up an institution or there arose a great action of mine. But much flowers make spring, many small pieces of mosaic a picture, much drops of water rain.

"So I work day by day for a new 'profile' of work. I have more security in many fields of social work, more knowledge how to do, and these new ideas overflow in all directions. About all this I speak with the young social workers, with the juvenile court, with the teachers, parents, and so on. There were some meetings with Government persons, doctors, and other official persons of responsibility in working out these new ideas.

"And I enjoy very much to fight against all kinds of misunderstanding between our peoples."

Servicio Contributions to Hospital Development

As seen by the evaluators, Servicio programs have contributed much to the improvement of hospital service in Latin America. Accomplishments, as well as deficiencies, of the programs in the development of physical facilities, planning, administration and operation, education, laboratory service, and patient care are reviewed.

THE BILATERAL health programs of the Institute of Inter-American Affairs and the governments of Latin America have brought modern hospital services of a fairly high quality to many sections of the Latin American countries which did not previously have them. The programs have shown that it is possible to provide modern hospital services to such areas as the Amazon Valley of Brazil, the Loreto Province of Peru, and many isolated sections in Ecuador and other countries. In Brazil, Ecuador, El Salvador, and Paraguay, the programs have demonstrated that it is possible in Latin America for hospital, health center, and general sanitation services to function effectively and efficiently together.

Wartime Influences

The fact that the health and sanitation programs were initiated during the period of World War II had much to do with the approach used in meeting the problems of hospital care. The existence of an emergency situation may account for negotiations with regard to hospital projects being made primarily at the national level without taking advantage of community leadership, participation, and support. It may account for the emphasis on the development of hospital services in such areas as the Amazon Valley in Brazil, the Loreto Province in Peru, and many sections of Ecuador—the locations of important war materials projects.

The emergency situation may also account for a seeming imbalance between countries and for the emphasis on hospital services in relation to other public health and sanitation projects. Finally, it may account in large measure for the great proportion of effort during the early days toward the construction of hospital facilities and the lack of nationwide appraisal of the long-range benefits to be derived from various projects.

Many of the early projects developed under titles other than hospital construction or operation have had outstandingly beneficial effects upon hospital services—the development of nursing schools and other training programs, for example. In addition, sanitation and special disease control projects have greatly reduced the need for hospital care, and public

This is the thirteenth in a series of excerpts from the report of the Public Health Service's evaluation of a decade of operation of the bilateral health programs undertaken by the Institute of Inter-American Affairs in cooperation with the governments of the Latin American Republics. For additional information, see p. 92.

health education programs have led to better utilization and appreciation of modern hospital services.

Program Emphasis

Hospital projects are included in the general category, medical and research facilities, which includes also dispensaries, health posts, traveling clinics, health centers, institutes, and laboratories. The percentage of total funds expended or allocated for projects in this category through June 30, 1951, was 36.9, ranging from 78.8 in Guatemala to 0 in Panama and Venezuela. Of the funds for projects in this category, 47.0 percent was for hospitals and sanatoriums; 43.4 percent, for health centers; and 2.4 percent, for institutes and laboratories. Guatemala, Honduras, and Ecuador placed major emphasis upon construction and operation of hospitals and sanatoriums, whereas Uruguay assigned no funds for such projects.

Of all the funds for hospitals and sanatoriums, 86.3 percent was for construction, equipment, and supplies, and only 13.7 percent was for maintenance and operation. In Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Haiti, Mexico, Nicaragua, and Peru, more than 90 percent of the funds for hospitals and sanatoriums was assigned to construction, equipment, and supplies. Brazil and Honduras, however, spent about one-half of their funds for maintenance and operation, and Paraguay, about one-third.

Types of Projects

Hospital and sanatorium projects were, in general, of two types: (*a*) projects to demonstrate modern hospital construction, equipment, and service; (*b*) projects to fill as completely as possible the gaps in service in a particular country.

The first is exemplified by such projects as the tuberculosis hospitals at Santiago, Chile, and Asuncion, Paraguay, and the maternity hospitals at Quito and Guayaquil, Ecuador. The hospitals developed and operated by the *Servicio* in the Loreto Province of Peru, the extensive system of hospitals in Ecuador, and the extensive program of hospital construction, operation, and maintenance in rural Brazil are examples of the service approach.

Physical Facilities

Although major contributions have been made toward the development of hospital plants in many of the large cities, the primary emphasis of the *Servicio* programs has been on the provision of modern hospital plant facilities in rural and small urban areas. In many communities, new plants have replaced antiquated, obsolete structures; in others, the construction has inaugurated hospital service for the area.

Construction has generally been adequate, but deficiencies of design and structure were observed in a number of hospitals. For example, the flooring at the general hospital in Iquitos, Peru, in a hot moist climate, was constructed of wood. This flooring was disintegrating rapidly and was being replaced. At a number of locations, equipment was supplied which was apparently beyond the capacity of the local people to utilize and maintain adequately. At several of the hospitals in one country, expensive refrigerators were being used for the storage of a small quantity of vegetables while the meat was hanging outside. Elsewhere, refrigerators were lying idle for want of maintenance service. In one hospital, expensive X-ray equipment had been duplicated and was lying idle. In contrast, however, there were many laboratories at hospitals built by the *Servicio* which were being utilized effectively and were providing diagnostic services which were not before available.

The large deficit in hospital facilities and the tremendous need for replacement of obsolete hospital plants, together with the apparent need for technical assistance in all of the countries visited, indicates a need for competent consultation services in the field of hospital design, construction, and equipment.

Planning

Servicio-sponsored projects for new hospital construction were undertaken in many areas without prior survey as to the actual needs of the hospital service area or to the existence and influence of other hospitals in the area. Such

prior study is required to determine proper location, size, type of structure, and design.

The field evaluation survey revealed a number of delays in carrying out *Servicio* hospital construction and in the actual opening of hospitals. These delays were found to be due to a number of factors, including lack of adequate equipment, staff, and funds.

In any new hospital project under the *Servicio* program, there should be prior planning, including arrangements to secure financial support and provision for adequate equipment and staff. A careful appraisal of these factors should be made to avoid assuming responsibility for any hospital structure or service which is professionally, administratively, or economically unsound.

Many of the *Servicio* programs, however, reflect sound planning. The Trudeau Tuberculosis Sanatorium in Santiago, for example, is outstanding in its care of tuberculosis patients. It was planned with prior attention to location, size, design, staffing, and educational potentialities.

Administration and Operation

The benefit of formal training provided by the Institute and the Kellogg and Rockefeller Foundations was observed in several hospitals where former trainees were doing outstanding work in improving operation. They were obtaining better patient care with shorter hospital stay and were carrying out effective educational courses for physicians, nurses, laboratory technicians, dietitians, record librarians, and hospital auxiliaries. The contribution of the *Servicio* program to the training of hospital administrators at the School of Public Health in Santiago, Chile, is especially noteworthy. It is an excellent example of a long-range method of improving hospital services throughout a country.

The *Servicio* programs have proved that it is possible to arrange for and provide adequate hospital service in many outlying underdeveloped areas in Latin America. The programs in the Loreto Province of Peru, as well as those in the Amazon Valley and other sections of Brazil, have made noteworthy contributions to hospital services. *Servicio* administration and operation of new hospitals, however, has sometimes extended beyond what might be regarded as a reasonable period of time. There were also instances in which, under *Servicio* or local responsibility, physical plants had been allowed to deteriorate.

As part of project planning, agreements should be reached as to the date when the *Servicio* will terminate operation and turn the hospital over to the indigenous health service. The *Servicio* should encourage the formation, wherever possible and feasible, of a local hospital board on which the *Servicio* might have representation. Continuing consultation should be offered to these boards and to the administrators of the hospitals, and no effort should be spared in encouraging the maintenance of the highest practical standards.

Application of Modern Techniques

The complexity of modern medical science and the multiplicity of skills and procedures required for comprehensive care of the individual patient have led to changes in the medical staffing of hospitals. Today, individual patient care may frequently require services of specialists in surgery, medicine, and allied branches, including pathology. This has resulted in a teamwork approach to the patient, and in a medical staff organization patterned after the major specialty branches of medicine. Although this has had a desirable effect upon the quality of individual patient care, it has placed a variable measure of restriction upon the physician's activities. It has also led to a certain amount of required supervision over the activities of the individual physician.

The *Servicio* programs have done much throughout Brazil, Chile, Peru, and, to a lesser extent, El Salvador, to bring about better distribution of physicians in the specialties required by hospitals. It has been demonstrated in these countries that full-time physicians, reasonably well reimbursed, can function well in a cooperative team approach in rendering hospital and clinic services. This approach has contributed importantly to the medical staff organization in several of the countries.

The programs have also demonstrated that by making available the newer drugs, including

the antibiotics, hospital stay can be shortened and a more favorable outcome of illness secured. Prenatal, postnatal, and infant hygiene services at health centers have had a beneficial effect upon existing obstetrical services in the hospitals. It seems certain that programs for training midwives in Chile, Ecuador, Peru, and the Amazon Valley in Brazil will be reflected in a greatly lowered maternal and infant mortality and morbidity rates.

Medical and Nursing Education

Indications of a great need among physicians, as well as nurses, for a more thorough background in preventive medicine and public health and in the economic and social aspects of community health and welfare suggest that more attention to these aspects of health services might reduce capital and operating costs in the hospitals.

On the whole, however, the *Servicio* programs have made outstanding contributions in the field of education as it relates to hospital services. The aid provided the School of Public Health at Santiago, Chile, and institutes and laboratories in Bolivia, Brazil, Chile, Colombia, Ecuador, and Nicaragua has contributed to the improvement of medical and public health practices, both within and without the hospitals. Since education is of fundamental importance in the application of modern scientific techniques, continued improvement in medical education is an important factor in improving medical care in hospitals.

Considerable advancement was noted in the field of nursing education. The *Servicio* project for the establishment and operation of the National School of Nursing in Quito, Ecuador, is considered a major contribution to hospital service in that country. Because of economic, social, and other factors, it is unreasonable, as yet, to expect the hospitals of the Latin American countries to adopt in full North American nursing practices.

Laboratory Services

At all of the hospitals included in the *Servicio* programs arrangements have been made for adequate laboratory space and equipment. The activities at a number of the institutes of hygiene were contributing toward a larger supply of laboratory personnel. The *Servicio*-built and -operated public health laboratory in Asuncion, Paraguay, is outstanding.

The improvement of laboratory services is a necessary adjunct to good medical care and more effective utilization of hospital beds. In cooperation with the ministries of health and the medical schools, attempts should be made to establish national standards for laboratory services and to encourage inauguration of an improved system of laboratories.

Patient Care

In several of the *Servicio*-sponsored hospital projects, local response to patient responsibility for the cost of hospital care was noted. Social security insurance is providing a mechanism for patient contribution. With the completion of many modern, well-equipped hospitals throughout the Latin American countries, the concept of patients contributing to the cost of care is becoming more widely accepted.

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With the funds available, the Institute of Inter-American Affairs and cooperating Latin American governments have made excellent progress in the field of hospital service. The accomplishments have earned the admiration of leaders in all fields. The demonstration of techniques and procedures has contributed importantly toward the stimulation of community, regional, and national interest and activity, which has resulted in a large measure of success in a cooperative attack on the health problems in Latin America.

technical publications

Public Health Service Research Grants and Fellowships, 1952

Public Health Service Publication No. 289. 1953. 53 pages. 20 cents.

Since 1938 the Public Health Service has had a research grants and fellowships program with the purpose of improving the general health level by supporting scientific research in the many fields related to health. The program is administered by the National Institute of Health. Grants are awarded after review by panels of technical experts and upon recommendation by the national advisory councils.

This publication lists the 1,789 grants and 540 fellowships awarded from fiscal year 1952 funds. The listings are by State or country, and by city and institution. The amount of the grant and subject of study are given.

Proceedings of the First Conference of Mental Hospital Administrators and Statisticians

Public Health Service Publication No. 295. 13 pages; appendix. Available on request to the National Institutes of Health, Public Health Service, Washington 25, D. C.

The demand for adequate and uniform data relating to the extent of mental illness and the characteristics of the mentally ill is ever increasing. For this reason, a group of mental hospital administrators and statisticians, representing 11 States, met and conferred in 1951, to determine how statistics on hospitalized mental illness could be made more adequate.

This publication contains summaries of the discussions which included: statistical needs of the mental hospital administrator; research uses of mental hospital data; nomenclature and statistical classification of mental disorders; definition of first admission; model reporting area for mental hospital statistics. Members of the conference are listed in the appendix.

Clean Water for the Western Great Lakes Region

Public Health Publication No. 267. 1953. 6 pages. 5 cents.

Another in the series of informal summaries based on the longer technical water-pollution reports, this publication is directed to the people living in the area of Lakes Superior, Huron, and Michigan. It points up the water pollution problems in this region, stressing the damage to recreational areas important to the economy of the surrounding States.

According to the leaflet, there are 610 municipal sources of pollution with sewerage systems serving 6,930,000 people. About 5,700,000 of these people are served by 313 sewage-treatment plants, although only 192 of the plants are completely satisfactory. Local support of public action to improve this situation is urged.

Rural Health. Annotated List of Selected References

Library List No. 60, U. S. Department of Agriculture. June 1953. 83 pages. A limited number of individual copies are available upon request to Public Inquiries Branch, Public Health Service.

A cooperative effort of the Division of Hospital and Medical Resources, Public Health Service, and the Division of Farm Population and Rural Life, U. S. Department of Agriculture, this list brings together significant material on rural health published since 1945 and also includes many references to earlier studies. It represents a review of available literature, rather than a critical appraisal, and inclusion of a publication does not imply support of the study findings.

The list is divided into three sections: rural health in the national setting, rural health in the State setting, and approaches to rural health problems. The first two sections include mainly general references and special studies of rural health status, health resources, and official and voluntary health programs on a national, regional, State, or local basis. The third section emphasizes approaches to rural health problems and includes popular articles describing specific community techniques or activities. A total of 441 references is given.

Deaths and Death Rates for 64 Selected Causes, United States, Each Division and State, 1950

Vital Statistics Special Reports. National Summaries, vol. 37, No. 10, September 11, 1953. 33 pages; tables. Available from the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

In 1950, there were 1,452,454 deaths registered in the United States, or 9.6 deaths per 1,000 population, excluding the Armed Forces overseas. This rate and the death rate for most States in 1950 were the lowest on record, continuing the downward trend that has characterized mortality rates since 1900.

This special report includes tables giving number of deaths and crude death rates for 64 selected causes by division and State, and death rates for these causes by race, geographical division, and selected States. A brief analysis of the data precedes the tabular material.

technical publications

Trailer Court Sanitation With Suggested Ordinances and Regulations

Prepared by the Division of Sanitation, Public Health Service, and printed as a public service by the Trailer Coach Manufacturers Association. Available to public health agencies in States and municipalities from the Division of Sanitation, Public Health Service, Washington 25, D. C.

This manual of trailer court sanitation was prepared as a result of many requests from State and municipal health authorities and from industry for a set of ordinances and regulations governing trailer courts which would be broad enough in scope for nationwide use, yet easily adapted to local regulations. It is designed to serve as a guide to trailer court owners and operators, Federal agencies, and State and local health and zoning authorities.

Recommendations incorporated come from such sources as the Conference of State Sanitary Engineers, and bear the endorsement of the Conference of Municipal Public Health Engineers. The standards established in the manual are for site provisions; location, construction, and maintenance of service buildings; water supply and sewage disposal; refuse disposal; insect and rodent control. Standards for electricity, fuel, and fire protection are also given.

for the general public

Tetanus (Lockjaw)

Health Information Series, No. 45. Public Health Service Publication No. 159. Revised March 1953. 1-fold leaflet. 5cents; $1.75 per 100.

This health information leaflet has been revised to place greater emphasis on the prevention of tetanus. The importance of immunization of all children in infancy is stressed, and adults are urged to check with their physician or health officer to determine whether they should have this protection.

Immunization schedules are given, and prompt treatment of punctured or torn wounds is urged. The leaflet also includes information on the cause of tetanus, source of infection, and symptoms of the disease.

This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained wtihout charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Cleveland HEW Regional Office Closed

The Cleveland regional office of the Department of Health, Education, and Welfare was closed in November. Activities for Ohio and Michigan were transferred to the jurisdiction of the Chicago regional office and for Kentucky to the Washington, D. C., regional office.

The Public Health Service Outpatient Clinic and the three offices of the Bureau of Old Age and Survivors Insurance remain in Cleveland, as well as local services of the Food and Drug Administration, the Office of Education's school assistance program, and the Social Security appeals referee's office.

Lack of funds made it necessary to close one of the 10 regional offices of the Department. After months of careful study, with the prime objective of not weakening the efficiency of the Department's operations, the Cleveland office was selected for closing.

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